Social Aspects of Pacific Pelagic Fisheries

Phase I: The Hawai`i Troll and Handline Fishery

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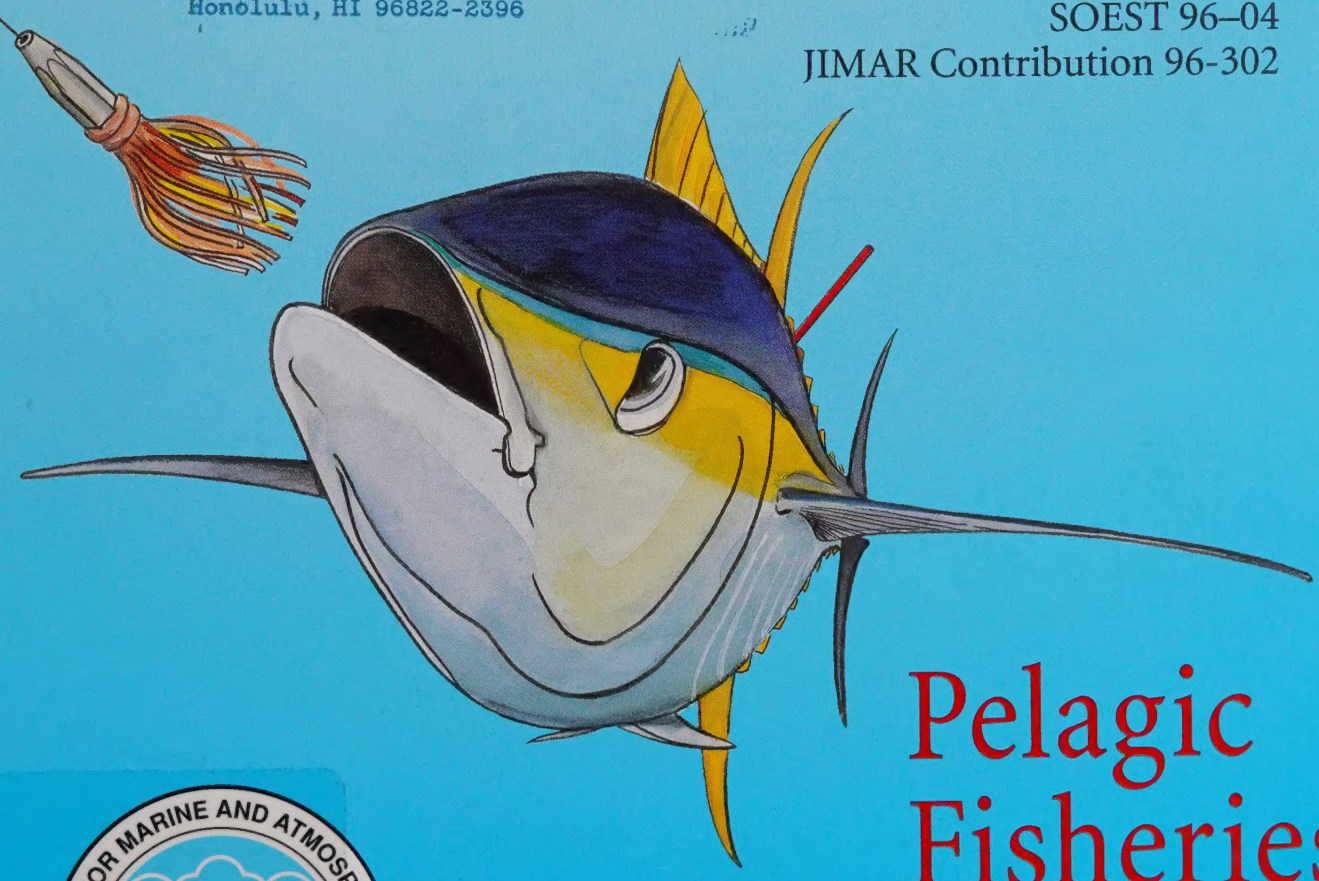

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EXECUTIVE SUMMARY

A prerequisite for the development of marine fishery management objectives and regulations to achieve these is an understanding of the human and biological components of fishery systems and their environments. Fishery science—an applied field involving the disciplines of fishery biology, oceanography, mathematics, statistics, and more recently, economics, cultural anthropology, and sociology—contributes to fishery management with analyses of fishery structures and processes.

The research reported here was designed to meet the needs of the Western Pacific Regional Fishery Management Council (WPRFMC). The Council, created with the passage of the Magnuson Fishery Conservation and Management Act (MFCMA) of 1976, has jurisdiction for fisheries conducted in the 3-200 nautical mile US Exclusive Economic Zone encompassing waters surrounding the islands of Hawai`i, Guam, American Samoa, and the Commonwealth of the Northern Marianas.

One of the fisheries managed by the Council concerns the harvest of large pelagic species including tunas, billfish, *mahimahi, ono,* and sharks. In accordance with the MFCMA, *optimum yield* is prescribed on the basis of maximum sustainable yield "as modified by any relevant economic, social or ecological factor." In making policy, the Council determines the amount of fish that can be harvested and how opportunities to access fish should be distributed among elements of industry.

The fishery management problem addressed in this *Phase I* report is that virtually nothing is documented about the human component of the Hawai`i offshore troll and handline pelagic fishery. This sector is composed of up to 10,000 small boat (under 45') vessels registered with the Hawaii Department of Land and Natural Resources. Of these, only 2,000 to 3,000 boat owners have commercial marine licenses required for the sale of fish.

The overarching goal of this multi-phase project is a baseline sociocultural case study of the Hawai`i troll and handline pelagic fishery. Specific *Phase I* objectives were to 1) describe the *institutional environment* of the fishery, 2) reveal the *social organization* of the fishery, and 3) identify fishermen's perceptions of *fishery issues*. Another major research goal was to develop a *conceptual framework* for the continuation of cultural and social studies of the fishery.

This document consists of six major sections. Section 1.0 is an introduction; Section 2.0 presents research goals, Section 3.0 presents a conceptual framework in which the human component of the fishery is defined as a system of harvesting, distribution, management, and public elements. Section 4.0 describes the institutional structure of the fishery with reference to an array of federal, state, county, and traditional authorities that achieve social control through laws, regulations, and customs.

Section 5.0 reports on the harvesting sector of the troll and handline pelagic fishery. Field data were collected through informal, open-ended ethnographic interviews conducted with well over a hundred fishermen and an exploratory survey (N=54) of fishermen on the islands of O`ahu and

Hawai`i. A first subsection presents *geartype and seasonable patterns* of fishing; a second subsection reports species patterns.

The third harvesting sector subsection describes the social and cultural patterns that characterize Hawai`i styles of troll and handline fishing. The importance of fishing in Hawai`i transcends the fishing trip and extends to the selling and sharing of fish, and also to talk story discourse. The *social organization* of pelagic crews show *`ohana* ("family"), *hui* ("firm"), *hoaloha* ("friendship"), and *combination* structures.

The *social and cultural processes* that shape troll and handline fishing are described by a ritual model of fishing production. With this model, fishing generates sacred objects and moral and social solidarity within the fishing community. In providing the opportunity for the development and maintenance of relationships, fishing brings people together and gives meaning to the lives of fishermen, their family, and friends.

Hawai`i styles of pelagic fishing are shown to have *profit*, *holoholo* ("recreational"), *kaukau* ("subsistence"), and *expense* variants. Troll and handline fishing *motivations* are described by a model of fishing action. *Fishing action* is a problematic and consequential activity engaged in for its own sake. Phases of generic and tournament fishing action are illustrated. Fishing *reputation* and character are demonstrated to be of central importance in the pursuit of fishing action.

In the second section, fishery management issues are defined as a mixture of problems and opportunities. A conceptual model of the natural history of fishery management problems is discussed. Fishermen's perceptions of management issues are presented against this framework. Problem categories include overfishing, resource depletion, competition, and pollution and waste. Finally, fishermen's cognitions of pelagic species are reported. Results suggest that cognitive differences mirror fishing styles.

Section 6.0 remarks on the relevance of findings for management of the pelagic fishery. Results are pertinent to WPRFMC social science research priorities. In particular, this study will be useful in the development of a monitoring system for classifying fishing styles and motivations. This is needed to improve measurements of fishing activities required for the determination of optimum yield, and also to determine the consequences of policy decisions for the cultural and social condition of the fishery. It is further hoped that concepts presented in this study will be of use to social scientists who plan fishery research in the Western Pacific.

Appendices to this report include an annotated bibliography of related troll and handline surveys in Hawai`i and reproductions of corresponding survey instruments, and an introduction to the study of local knowledge, among other materials.

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LIST OF ACRONYMS AND ABBREVIATIONS

DAR	Division of Aquatic Resources
DBEDT	Department of Business, Economic Development and Tourism
DLNR	Department of Land and Natural Resources
DOCARE	Division of Conservation and Resource Enforcement
DOT	Department of Transportation
ESA	Endangered Species Act of 1973
FAD	Fish Aggregation Device
FMP	Fishery Management Plan
MFCMA	Magnuson Fishery Conservation and Management Act of 1976
MHI	Main Hawaiian Islands
MMPA	Marine Mammal Protection Act of 1972
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWHI	Northwest Hawaiian Islands
OCRM	Ocean and Coastal Resources Management (NOAA)
OY	optimum yield
PPFRP	Pelagic Pacific Fisheries Research Program
PPMUS	Pacific Pelagic Management Unit Species
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WPacFIN	Western Pacific Fishery Information Network
WPRFMC	Western Pacific Regional Fishery Management Council

1.0 INTRODUCTION

1.1 Background

Fishery management is an exercise in which an authority develops and implements policies in the best interests of its citizenry. In the federal context, eight regional fishery management councils established with passage of the Magnuson Fishery Conservation and Management Act (MFCMA) of 1976 determine optimum yields for fisheries conducted within the 3-200 nautical mile US Exclusive Economic Zone.

In accordance with the MFCMA mandate, the regional councils rely heavily on multidisciplinary fishery science. Part of this applied science is organized to inform councils about the present condition of fisheries, about trends, and about possible futures. Some analyses go beyond description, simulation and prediction and provide normative guidance.

Fishery management policies require answers to two interlocking questions. The first of these—sometimes termed the *conservation question*—is "How many fish can be harvested on a sustainable basis without undue hardship to other important species and the environment?" Disciplines addressing this question are fishery biology and oceanography.

The second question—often called the *allocation question*—is "How should the opportunities to harvest fish be allocated to elements of the fishing industry?" Sociology, cultural anthropology, economics and the other disciplines of the social sciences address this question

Perhaps the fundamental question to be answered as a prerequisite to any final allocation decision (concerning, for example, the imposition of a moratorium on fleet size, a license limitation or individual fishermen's quota regime, or the allocation of access through time and area closures) is the following: "What is the importance of fishing to fishermen and to society?" This question can be approached in two complementary, but different ways. Economic studies of fisheries commonly utilize the notion of economic value. Cultural and social research examines the significance of fishing in generating social and moral solidarity critical for the sustainability of fishing communities, and in providing lifestyle and fishing identity options that give meaning to life. In this research, we make terminological distinctions adopted by the Western Pacific Regional Fishery Management Council concerning the application of the social sciences:

> "The term *cultural* pertains to what it is (*e.g.,* mores, rules, facts) that people 'know' in order to behave in society. [T]hese knowledge bases are the essence of what is often called custom or tradition. The term *social* refers to human behavior that has 'meaning' for the actor or for others. [T]he term *economic* refers to the 'decisions' that people make... arising from a consideration of various means and ends, given a set of actor preferences." (WPFRMC, 1995)

Cultural and social studies of fisheries generally emphasize the roles of *convention* and *situational context* in explaining what people do. In a complementary way, economic studies focus on the many *choices* that people make.

1.2 Plan of This Report

The research discussed in this document is the first part of a multi-phase project that seeks to display the social and cultural order characterizing the Hawai`i troll and handline fishery.

This report consists of six major parts accompanied by appendices and references. Section 1.0 introduces the general research opportunity. Section 2.0 identifies project goals and objectives. Section 3.0 presents the conceptual framework of the project in which the human component of fisheries is seen to have harvesting, distribution, management, and public elements. Section 4.0 describes the institutional environment of the Hawai`i troll and handline fishery. Section 5.0 examines the harvesting sector, addressing geartype and seasonal fishing patterns, social organization, social and cultural processes, motivation, fishing action, fishermen's perceptions of management issues, and fishermen's cognitions of major pelagic species. In each of the subsections of 5.0, a theoretical orientation precedes questionnaire and interview findings. Finally, Section 6.0 discusses the fishery management implications of project results.

Appendices include an annotated bibliography of related troll and handline surveys in Hawaii and reproductions of corresponding survey instruments, and an introduction to the study of local knowledge, among other materials.

2.0 RESEARCH GOALS

The overarching goal of this multi-phase project was a baseline sociocultural case study of the Hawai`i troll and handline pelagic fishery. The case study approach was organized to generate a sociocultural description of the condition of the fishery and a foundation for monitoring. In Ragin's (1992a) terminology, the project is designed to begin by taking "fishery" as a specific-empirical category, seeking to determine inductively the boundaries of the Hawai`i example.

Using White's (1992) methodological vocabulary, the study is primarily driven by a concern for resolving the practical questions of fishery *identity* and *control*. More strictly academic questions of *explanation* are of secondary importance. Justification for this weighting of priorities is provided by Ragin (1992: 94):

> "If you want to understand control, you should not turn to the comparative/statistical case study, which explains so nicely—which to be precise, explains away so nicely."

For discussion of social science case study research, see *Social Science Research Priorities for the Western Pacific Council Fisheries* (WPRFMC, 1995).

Specific Phase-I objectives were to:

1. describe the *institutional environment* in which pelagic fishery management policies are designed and implemented,
2. reveal the *social organization* of the troll and handline fishery, and
3. identify *fishery issues* and problems perceived by the harvesting sector.

An additional and continuing research goal is to develop a *sociological vocabulary of fishing* that would both 1) fit with the way fisheries are discussed and experienced by Hawai`i troll and handline fishermen, and 2) establish a conceptual foundation for assessments of the human condition of the fishery complementary to the microeconomic framework and of practical value to the Western Pacific Regional Fishery Management Council community.
Throughout this report, terminology with technical meaning appears in *italics*. For a fishery social science glossary, see attached Glossary of Fishery Social Science Terms.

3.0 CONCEPTUAL FRAMEWORK

3.1 The Hawai`i Troll and Handline Pelagic Fishery

In elementary terms, a *fishery* exists when a human population purposively engages in a relationship with a "fish" population. It is common for fisheries to be labeled by such criteria as geartype, principal species, fishing region, and port of landing. Accordingly, the "Hawai`i troll and handline pelagic fishery" is used here to denote fishing operations targeting tuna, billfish, *mahimahi*, *ono*, and other large pelagic species within the US Exclusive Economic Zone in waters off the coastline of the Hawaiian Islands. Of focal interest is the Pacific Pelagic Management Unit Species (PPMUS) complex under the purview of the Western Pacific Regional Fishery Management Council (Table 3.1).

From an applied sociological perspective, the human organization of the Hawai`i troll and handline pelagic fishery (Figure 3.1) is composed of four parts—a harvesting element, a distribution element, a management element, and a public element (see Miller and Gale, 1986, and WPRFMC, 1995).

3.1.1 Harvesting Element

In this report, we follow local convention and use the term "fisherman" to include both men and women who fish. We note that the term "fisher" is objected to by many participants on the grounds that the term a) already denotes a large dark brown North American arboreal carnivorous mammal related to the weasels, and b) has bureaucratic origins.

The harvesting element of the troll and handline fishery consists of fishermen with combinations of commercial, charter (*i.e.,* service), recreational, and subsistence motivations (Table 3.2). Harbors and launching sites used by these fishermen on the main Hawaiian islands are shown in Maps 3.1 through 3.6. A profile of the Kewalo Basin (Honolulu) charterboat fleet is found in Appendix 1.

The careers of pelagic fishermen show that some individuals use both troll and handline gear and participate in other fisheries, and that others have non-fishing occupational commitments as well. The patterns of this diversification are an important topic of this report.

Table 3.1 Pacific Pelagic Management Unit Species (PPMUS)[1]

	Common Name	Scientific Name	Hawaiian or Local Name	Season Peak
Billfish	Blue Marlin	*Makaira mazara*	A`u	May-September
	Black Marlin	*M. indica*	Kajiki, A`u	May-July
	Striped Marlin	*Tetrapturus audax*	Nairagi, A`u, A`uki	February - June
	Broadbill Swordfish	*Xiphias gladius*	Broadbill, Shutome, A`u ku	April- July
	Shortbill Spearfish	*T. angustirostris*	Hebi, A`u	June-December
	Indo-Pacific Sailfish	*Istiophorus platypterus*	A`u lepe	
Tunas	Albacore	*Thunnus alalunga*	Ahi palaha, Tombo	July-September
	Bigeye Tuna	*Thunnus obesus*	Mebachi, Ahi po`o nui	October-May
	Yellowfin Tuna	*Thunnus albacares*	Ahi, Shibi	May-September
	Northern Bluefin Tuna	*Thunnus thynnus*	Maguro	
	Skipjack Tuna	*Katsuwonus pelamis*	Aku	May-September
	Black Skipjack/ Mackerel Tuna	*Euthynnus affinis*	Kawakawa	
	Dogtooth Tuna	*Gymnosarda unicolor*	Hagatsuo	
	Frigate Tuna	*Auxis spp.*		
Sharks	Blue Shark	*Prionace glauca*		
	Mako Shark (short-fin)	*Isurus oxyrinchus*		
	Mako Shark (long-fin)	*Isurus paucus*		
	Oceanic White-tip Shark	*Carcharhinus longimanus*		
	Thresher Shark	*Alopias superciliosus*	Mano Hi`uka	
	Tiger Shark	*Galeocerdo cuvieri*		
Other Pelagics	Dolphinfish	*Coryphaena hippurus*	Mahimahi, Lapalapa	peaks in April and October
	Wahoo	*Acanthocybium solandri*	Ono	
	Moonfish[2]	*Lampris spp.*	Opah	
	Oilfish	*Ruvettus pretosus; Lepidocybium flavobrunneum*	Walu, Escolar	
	Pomfret	*Bramidae*	Manchong	

Sources: Hawaii Fishing News Tide-Moon and Hawaii Fishing Almanac, 1994.
Western Pacific Regional Fishery Management Council Annual Report, 1993.
Pacific Fisheries Consultants Report: *Native Hawaiian Fishing Rights,* 1990.

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[1] Until the 1990 amendments to the Magnuson Act (P.L. 101-627), Pelagic Management Unit Species (PMUS) did not include tunas. Note that the term PPMUS does include the tunas, and the *Fishery Management Plan* has been amended to reflect the change (57 FR 48564).

[2] Moonfish, Oilfish and Pomfret were added as PPMUS in Amendment 7 to the *Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region,* January 1994.

Figure 3.1 Human Organization of the Hawai`i Troll and Handline Fishery

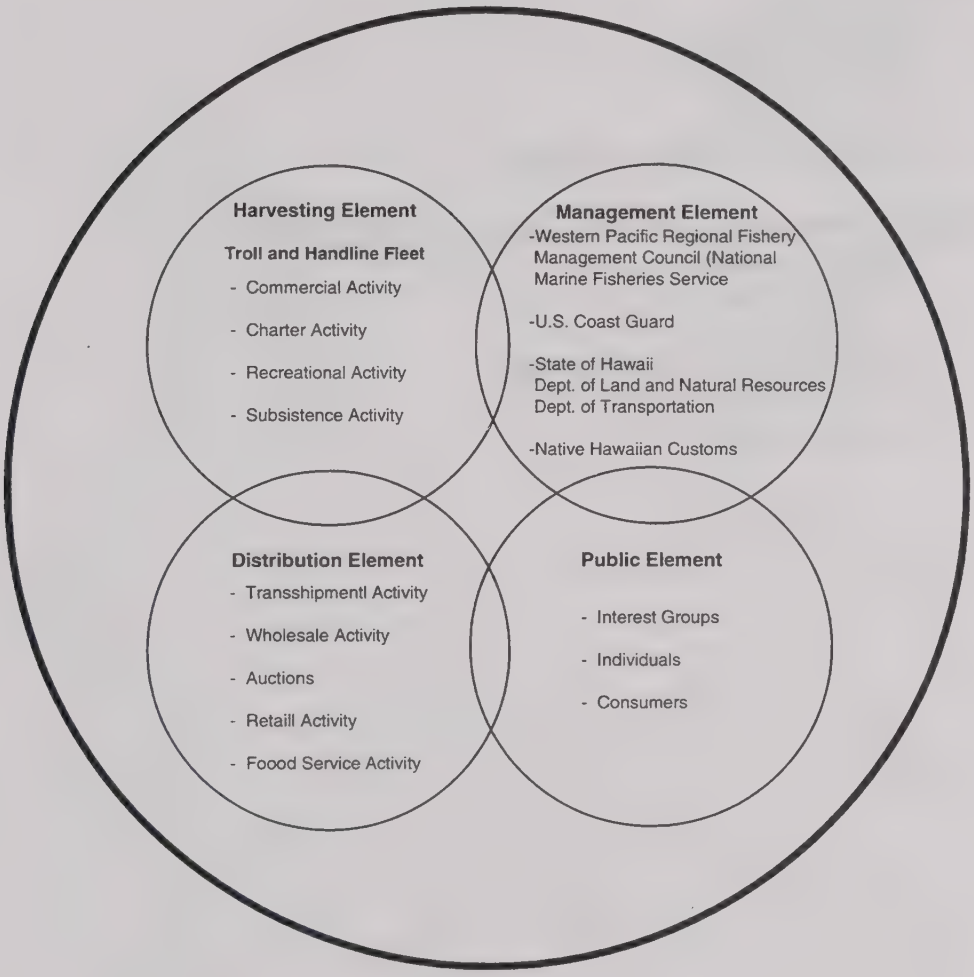


Table 3.2 Components of the Hawai`i Troll and Handline Pelagic Fleet [1]

I. Troll Component

1. Charterboat element
2. Commercial element
   a. full-time vessels
   b. part-time vessels
3. Recreational and subsistence element

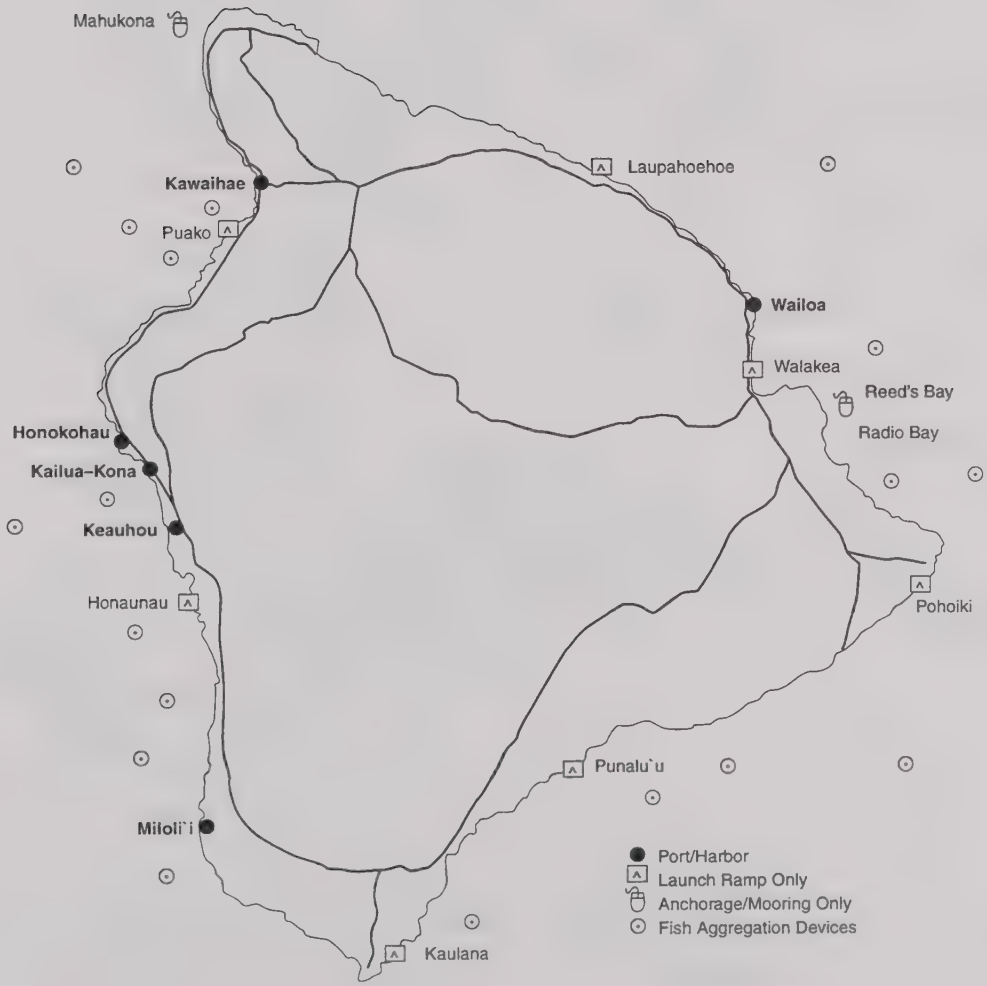
II. Handline Component (some vessels engage in the troll fisheries)

1. Commercial element
   a. full-time vessels
   b. part-time vessels
3. Recreational and subsistence element
   a. full-time vessels
   b. part-time vessels

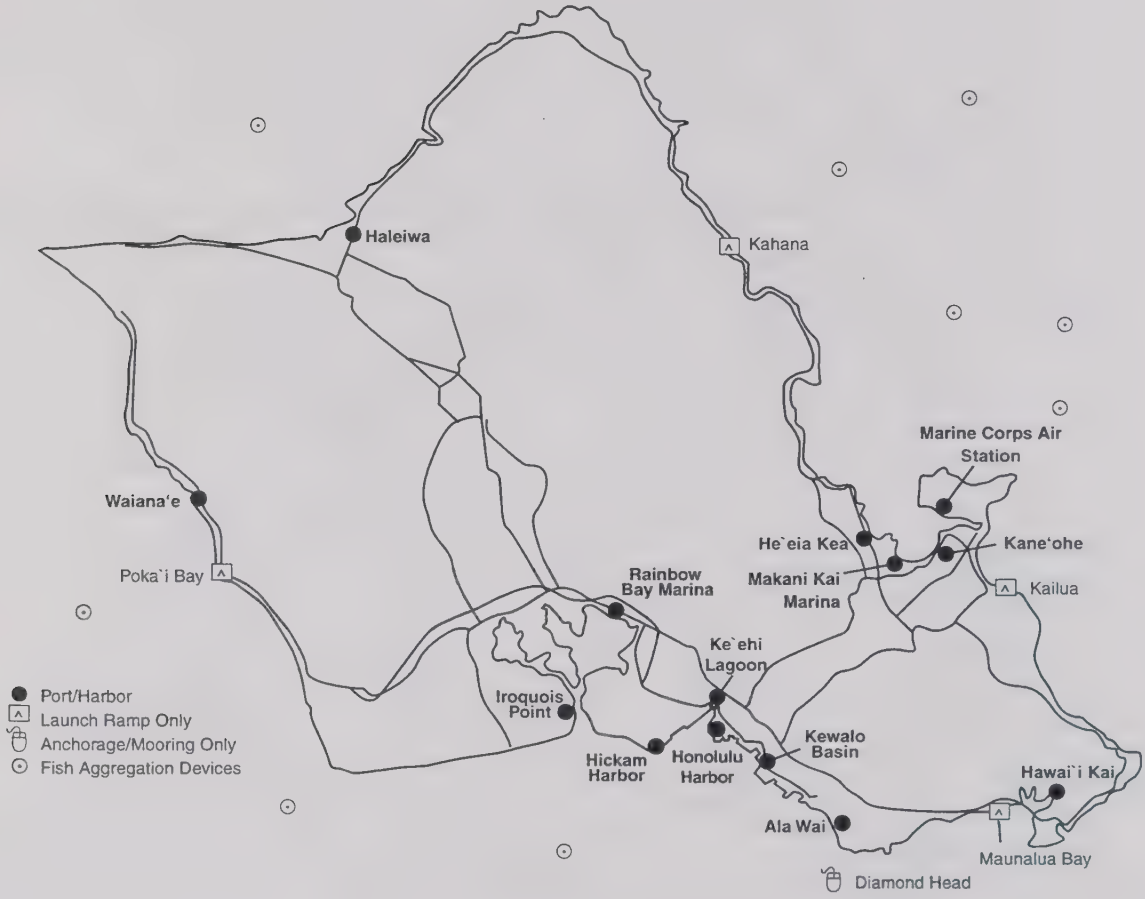
---

[1] Includes roughly 1,900 "troll and handline combined" commercial vessels and an unknown number of recreational and subsistence vessels: Some vessels are used for mixes of commercial recreational and subsistence purposes: Some troll vessels also engage in handline, bottomfish, and lobster fisheries: Components of the fleets are found an all islands. Other components of the pelagic fleet are the longline fleet (roughly 170 interim entry permits have been issued to date), the skipjack baitboat (*aku* vessel) fleet, and a few West Coast vessels that land swordfish and albacore on the West Coast.

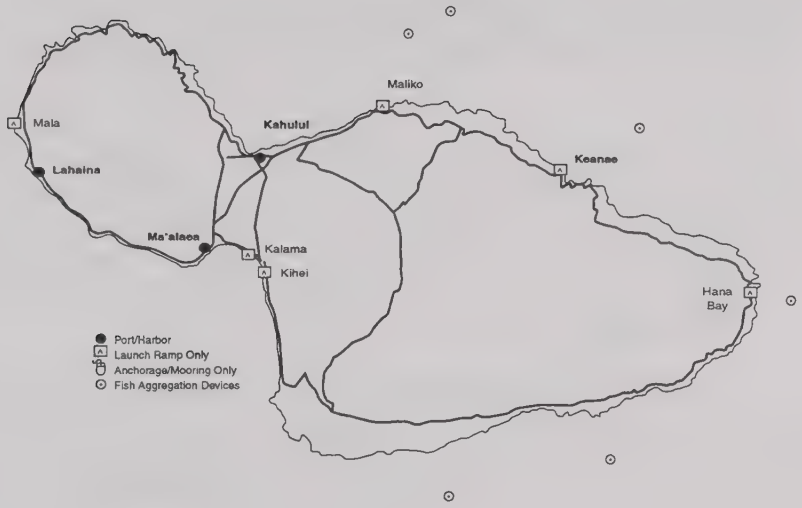
Map 3.1 Hawai`i Troll and Handline Fishery: Hawai`i Boat Facilities and Access Points



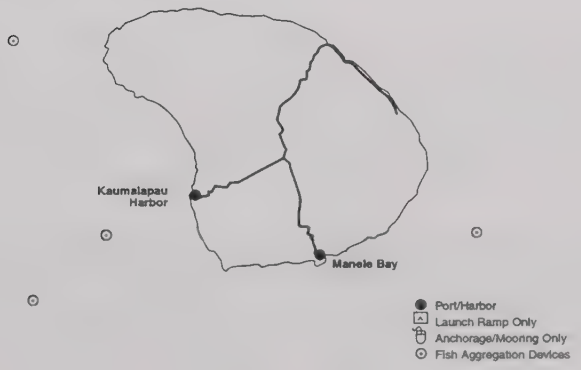
Map 3.2 Hawai`i Troll and Handline Fishery: O`ahu Boat Facilities and Access Points



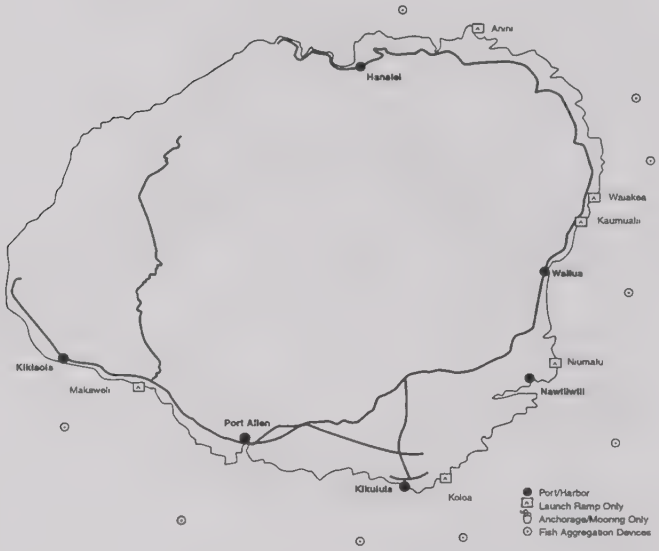
Map 3.3 Hawai`i Troll and Handline Fishery: Maui Boat Facilities and Access Points



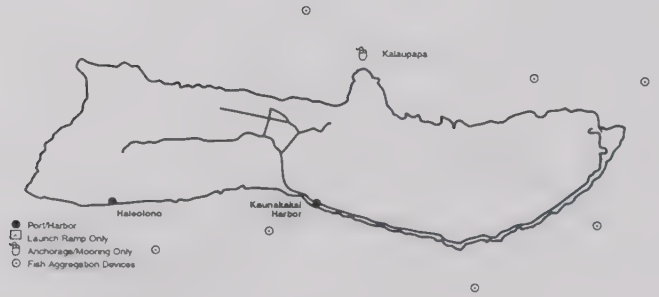
Map 3.4 Hawai`i Troll and Handline Fishery: Lana`i Boat Facilities and Access Points



Map 3.5 Hawai`i Troll and Handline Fishery: Kaua`i Boat Facilities and Access Points



Map 3.6 Hawai`i Troll and Handline Fishery: Moloka`i Boat Facilities and Access Points



3.1.2 Management Element

The management element of the Hawai`i troll and handline fishery consists of government and cultural entities with the authority to directly and indirectly influence fishery policies.

3.1.3 Distribution Element

The distribution element of the troll and handline fishery encompasses the processing and marketing sectors and involves transshipment, wholesale, auction, retail, and food service activities. The distribution of troll and handline fish—whether by the fishermen themselves or by others—is outside the scope of the Phase I of research discussed in this report.

3.1.4 Public Element

The public element of the troll and handline fishery consists of people who themselves do not fish. The fishery public includes a mixture of interest groups (*e.g.,* environmental and other organized constituencies) and individuals (*e.g.,* consumers, visitors) with a hinterland connection to the harvest activities. The structure of the public element of the Hawai`i troll and handline fishery is outside the scope of this Phase I report.

3.2 The Pacific Pelagic Fishery System

Fisheries, of course, are often interconnected and the Hawai`i troll and handline pelagic fishery is no exception. The pelagic system is an example of what has been termed a "natural resource management system" (Miller *et al.* 1986 and Miller and Francis, 1989). Target pelagics have ecological linkages to other living things and the environment. Similarly, troll and handline fishermen are seen to co-exist with fishermen who harvest other species in the same area, or who fish elsewhere (for example, inshore or onshore) but share a community of residence. In this context, the Hawai`i troll and handline fleet and associated fleets can be described as falling within the harvesting component of the complex Pacific pelagic fishery management system.

4.0 MANAGEMENT ELEMENT

This section describes the condition of the *management element* of the troll and handline fishery depicted in Figure 3.1. *Fishery management* is a human endeavor in which both sides of the fishery equation (*i.e.,* populations of fish and people) are subject to a regulatory authority. Fishery sanctions can be formally implemented by federal, state, county and traditional entities, and informally imposed by the local community, the family, and other social networks.

The institutional environment of the Hawai`i troll and handline fishery consists of laws, regulations, and customs, and the elements of government and society with responsibilities for these (Tables 4.1 and 4.2). Regulatory entities with direct pelagic fishery management functions are embedded in a larger institutional structure. Management entities in the Hawai`i *marine affairs system* have policy design, implementation, and enforcement powers over a broad range of ocean and coastal zone activities that have the potential to affect pelagic and other fisheries.

4.1 Federal Management Entities

Fisheries in the 3 to 200 nautical mile US Exclusive Economic Zone around the Hawaiian Islands are regulated under the Magnuson Fishery Conservation and Management Act of 1976 (MFCMA). This act created eight regional fishery management councils responsible for the

development of fishery management plans (FMPs) for selected fisheries within their jurisdictions. The councils cooperate with one another in the management of fisheries conducted in multiple jurisdictions.

The Western Pacific Regional Fishery Management Council (WPRFMC), based in Honolulu, oversees fisheries in waters surrounding the islands of Hawai`i, Guam, American Samoa, and the Commonwealth of the Northern Marianas, as well as other US islands in the Pacific (*i.e.,* Johnston Atoll, Kingman Reef and Palmyra Island, Jarvis Island, Howland and Baker Islands, and Wake Island). WPRFMC utilizes the advice of industry advisory panels, a scientific and statistical committee, and the public. The Honolulu Laboratory of the Southwest Fisheries Research Center (National Marine Fisheries Service[NMFS]) and the State of Hawaii Division of Aquatic Resources (DAR) work closely with WPRFMC in developing fishery management plans. For a summary of database categories and reporting requirements for the troll and handline fishery, see Table 4.3.

Western Pacific Council fishery management plan teams focus on pelagic and other important fisheries. FMPs are forwarded by the Council for approval and implementation to the head of the Department of Commerce. In the case of the WPRFMC, FMPs are submitted through the Southwest Regional Office (located in Long Beach, California) of NMFS. The Southwest Region in turn forwards these with advice to the Washington, DC office of NMFS to which authority to approve plans has been delegated by the Secretary of Commerce subject to Secretarial notice and review. Enforcement of the fishery management plans is provided by NMFS's Southwest Enforcement Office and the US Coast Guard.

Until 1990, highly migratory species were specifically excluded from the Magnuson Act. When Congress amended the MFCMA by striking the original language, "except highly migratory species," WPRFMC was given the responsibility to address tuna issues, and tunas were added to the Pacific Pelagic Management Unit Species complex (see Table 3.1) and incorporated in the *Fishery Management Plan for the Pelagic Fisheries of the Western Pacific Region* (WPRFMC, 1987). The Council is presently in the process of negotiating an agreement with the Pacific and Northern Pacific Regional Fishery Management Councils whereby WPRFMC would possibly be designated the lead council for all US tuna fishery management in the Pacific. For a brief listing of recent WPRFMC pelagic management actions and activities, see Table 4.4.

At the federal level, agencies in the Hawai`i marine affairs system that have regulatory powers over activities that affect Hawai`i fishermen include, the US Fish and Wildlife Service, the Office of Coastal and Ocean Resource Management, the Minerals Management Service, the National Park Service and the US Army Corps of Engineers.

4.2 State of Hawai`i Management Entities

Fishermen in Hawai`i state waters are subject to regulations from the Division of Aquatic Resources (DAR) within the Department of Land and Natural Resources (DLNR), the principal fishery management agency in the executive branch of government. DAR issues commercial fishing licenses, collects monthly catch reports from license holders, prohibits fishing in special conservation districts and harbors and prohibits certain gear and procedures. DAR regulations are enforced by the Division of Conservation and Resource Enforcement (DOCARE) in DLNR and

the Marine Patrol in the Public Safety Department. The Hawai`i State Legislature also performs an unusual amount of detailed rule-making, which in most other states is delegated to state administrative agencies or commissions through enabling legislation.

At the state level, the Hawai`i marine affairs system encompasses agencies whose regulations are not narrowly confined to matters of fishery management, but which nonetheless can directly affect troll and handline fishermen. For example, the Department of Transportation, Harbors Division, develops and manages harbors, access points, and launch ramp rules, and the Division of Boating and Ocean Recreation in DLNR establishes boating use regulations. The State of Hawai`i Department of Transportation and the US Coast Guard regulate and enforce marine safety. The DAR deploys and maintains fish aggregation devices (FADs) and the Department of Business, Economic Development and Tourism (DBEDT) encourages investment in fisheries and oversees boat loan programs.

4.3 County Fishery Management Entities

The eight local county planning and public works departments have regulatory powers over ocean and coastal activities which directly or indirectly involve or affect troll and handline fishermen.

4.4 Native Hawaiian Fishery Management

In this section, we follow convention and use the term "Hawaiian" to refer exclusively to indigenous Pacific cultural groups and their descendants. We use the term "Hawai`i" (as in "Hawai`i fisherman") as an adjective in some instances to mean any resident of the State of Hawai`i who fishes. (Hawaii Ocean and Marine Resources Council (1991), *Hawaii Ocean Resources Management Plan Technical Supplement*).

There is considerable archaeological, historical and ethnographic evidence that Native Hawaiian fishermen have been dependent on the fishery resources in Hawai`i for several centuries. There is a expansive set of traditional fishing rules, or *kapu,* that provided guidelines for fishing behavior.

These rules cover various components of the fishing experience, ranging from techniques to gear, to individual behavior on the water. One example of a fishing kapu (or taboo) is "Don't ask idle questions of canoe-men getting ready to go out fishing; they consider this an omen of bad luck." (Kawaharada, p.112.)

Kapu are either based on the injunctions of fishing gods (sometimes communicated through religious leaders), chiefly authority, or the transmission of *local knowledge* of the environment. (For additional information on local knowledge, see Appendix 2. For additional information on *kapu* systems, fishing legends and practices, see Kalakaua, p. 1-65; Malo, p. 208-213; Kamakau, p. 59-89.)

Traditional *konohiki* fishing practices in Hawai`i provided for a shared right to fishery resources years before western legal systems were imposed. The *Konohiki* system provided that landlords or chiefs established fishing practices within self-sustaining units. (For additional information on *konohiki* systems, see Murakami, p. 174-177.).

While these practices are no longer the dominant framework for fishing management, Native Hawaiians still participate in fishery activities, many of which are governed by federal and state laws. The MFCMA currently mandates the regional fishery management councils to take "historical fishing practices" into account when developing fishery management plans, but does not provide Native Hawaiians with rights of access to certain fisheries. Although there is currently no direct conflict between Native Hawaiian fishing access rights and federal and state regulations, Native Hawaiian rights are increasingly discussed and may provide future challenges to existing fishery regulations.

Table 4.1 Hawai`i Troll and Handline Fishery: Major Federal and State Fishing Laws and Codes

TITLE	FEDERAL CODE	CFR	PRINCIPAL AGENCY
Management Laws[1]			
Magnuson Fishery Conservation and Management Act of 1976 (MFCMA)	PL 94-265 as amended through November 1990.		
	16 *USC* §1801- et seq.	50 Parts 268, 298, 299, 600, 601, 602, 604, 605, 611, 619, 620, 625, 630, 638, 640, 641, 642, 644-647, 649-654, 655, 657, 658, 661-663, 669, 672, 674, 675, 676, 680, 681, 683, 685, 695	NMFS[2]
	16 *USC* §1801-1882	15 Part 904 50 Part 621	
	16 *USC* §1851	50 Part 656	
	16 *USC* §1851 note	15 Part 904	
	16 *USC* §1853	50 Part 603, 605	
Marine Mammal Protection Act of 1972 (MMPA)	PL 95-522 as amended through 23 Nov. 1988		NMFS and USFWS[3]
	16 *USC* §1361 et seq.	50 Parts 18, 216, 229, 230, 403, 611	
	16 *USC* §1361-1407	15 Part 904 50 Parts 17, 82, 216	
	16 *USC* §1361-1384	50 Parts 10, 215	
	16 *USC* §1361	36 Part 13	
	16 *USC* §1371-1372	50 Part 228	
	16 *USC* §1374-1375	50 Part 17	
	16 *USC* §1375 et seq.	50 Part 10	
	16 *USC* §1375-1377	50 Part 12	
	16 *USC* §1382	50 Parts 11-14, 17	
	16 *USC* §1385	50 Part 247	
	16 *USC* §1401-1407	50 Part 10	

[1] Legal references for MFCMA, MMPA, and ESA can be found in several sources. Public Law (PL) citations trace the origins of the laws to bills passed by Congress. Statutory citations in the United States Code (USC) indicate the most current codification of the laws. Corresponding Code of Federal Regulations (CFR) regulations are developed and promulgated by administrative agencies in the executive branch of government. For a detailed comparison of the MFCMA, the MMPA and the ESA with respect to conservation ethic, statute type, purposes, activities subject to regulation, policy system, supporting entities, functions, key concepts, policy process, scientific and public advice and judicial review, see Miller, M.L. and Broches, C.F., "North Pacific Fisheries and Reauthorization of the Magnuson Fishery Conservation and Management Act, Marine Mammal Protection Act, and Endangered Species Act" Northwest Environmental Journal, 9(1-2):1993.

[2] National Marine Fisheries Service, Department of Commerce.

[3] US Fish and Wildlife Service, Department of Interior.

Table 4.1 Hawai`i Troll and Handline Fishery: Major Federal and State Fishing Laws and Codes (cont.)

TITLE	FEDERAL CODE	CFR	PRINCIPAL AGENCY
Endangered Species Act of 1973	PL 93-205 as amended through 7 Oct. 1988		NMFS and USFWS
	16 *USC* 1531-1543	50 Part 217	
	16 *USC* 1531 et seq.	7 Part 650 19 Parts 10, 12 30 Part 773 32 Part 190 43 Parts 3480, 8340 50 Parts 23, 227 230, 402, 424, 450-453	
	16 *USC* 1531-1543	50 Part 17	
	16 *USC* 1531-1543	15 Part 904 50 Parts 10, 23, 81, 222, 225	
	16 *USC* 1531	36 Part 13 49 Part 1105	
	16 *USC* 1532	7 Part 355	
	16 *USC* 1533	50 Parts 17,226	
	16 *USC* 1538-1540	50 Part 13	
	16 *USC* 1538	7 Part 355 50 Parts 14, 17, 24	
	16 *USC* 1540	7 Parts 1,355, 356, 380 50 Parts 11, 12, 14, 17, 24, 217	
Vessel Registration and Safety Laws			
	46 *USC* 4505, 5101, 8103,8304,10601-2, 11101	30 Part 130 33 Parts 5, 26, 81, 88, 95, 151, 155, 156, 159, 173 46 Parts 4, 16, 25, 26, 28, 30, 67-69, 105 47 Part 80	US Coast Guard
Management Laws			
Aquatic Resources: Part I - General Provisions	187A	§13-74-1-4,10,22	DLNR-DAR[4]
Aquatic Resources: Part II - Fishing Rights	187A		
Fishing Rights and Regulations, Generally	188, Part II[5]	§13-74-1,4,10,21,40,41	
Hawai`i Fisheries Coordinating Council	188E		
Marine Life Conservation Program	190		

[4] Department of Land and Natural Resources, Division of Aquatic Resources.

[5] Part I of 188 repealed.

Table 4.1 Hawai`i Troll and Handline Fishery: Major Federal and State Fishing Laws and Codes (cont.)

TITLE	STATE LAW (*HRS*)[6]	ADMINISTRATIVE RULE	PRINCIPAL AGENCY
Licensing and Financial Requirements			
Commercial Fishing - License and Regulation Section	189, Part I	§13-74-1-4,20,42	DLNR-DAR
Large Fishing Vessel Loan Program	189, Part II		
Small Fishing Vessel Loan Program	189, Part IV[7]		
Harbors and Launch Rules			
			DOT[8]- Harbors Division

[6] *HRS* refers to *Hawaii Revised Statutes*.

[7] Part III of 189 repealed.

[8] Department of Transportation.

Table 4.2. Hawai`i Troll and Handline Fishery: Management Entities[1]

Level	Entity	Responsibilities	Jurisdiction[2]
International	Inter-American Tropical Tuna Commission	• No regulations in place	
	Forum Fisheries Agency	• Negotiation and coordination of member states fishery management efforts	
	South Pacific Commission Fisheries Program	• Research support for the FFA	
Federal	Western Pacific Regional Fishery Management Council	• Conservation and management of fishery resources through fishery plans • Encouragement of the development of fisheries which are currently underutilized	US Fishery Conservation Zone[3]
	US Coast Guard	• Licensing of vessels over 5 net tons • Inspection of all commercial fishing (CF) vessels for safety compliance • Oil/hazardous material response	State Marine Waters, US EEZ and High Seas
	Department of Commerce-National Marine Fisheries Service	• Implementation and enforcement of WPRFMC fishery management plans • Data collection for WPRFMC use • Endangered species and marine mammal protection	US Fishery Conservation Zone
	Department of Commerce-Ocean and Coastal Resources Management	• Coastal zone management • National estuarine research reserves • Marine sanctuaries	
	Department of Interior-Fish and Wildlife Service	• Marine mammal and endangered species protection • Federal aid in sport fish restoration account • National wildlife refuges	
	National Pollution Elimination Discharge System	• Hazardous waste permits • Nonpoint source pollution program • Wastewater treatment systems rules	
	Department of Interior-Minerals Management Service	• Administration of OCSLA oil and gas leases	
	International Trade Administration	• Fisheries export market information	

[1] The shaded regions on this chart reflect entities with primary fishery management authority. Those areas that are not shaded show the entities which regulate ocean resources (not specifically fishery resources) and thus may have effects on the troll and handline pelagic fishery.

[2] For further information on laws granting these jurisdiction, see Table 4.1.

[3] The Fishery Conservation and Management Act of 1976 declares that the US shall exercise exclusive fishery management authority over all fish within the *fishery conservation zone* (defined as a line coterminous with the seaward boundary the each of the coastal states, and the outer boundary of such zone is a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured), over all anadromous species through out the migratory range of each such species, and all continental shelf fishery resources beyond the fishery conservation zone. 16 *USC* §1811-1812.

Table 4.2 Hawai`i Troll and Handline Fishery: Management Entities (cont.)

Level	Entity	Responsibilities	Jurisdiction[4]
Federal	National Park Service	• Marine areas adjacent to coastal national parks	
	Corps of Engineers	• Harbor Facilities • Permits for activities in navigable waters • Offshore mooring permits	
State	Department of Land and Natural Resources-Division of Aquatic Resources	• Issuance of Commercial Marine Licenses (see Table 4.3) • Collection of Fish Catch Reports (see Table 4.3) • Compiling summary commercial landing trend reports • Completing installation and testing of statewide computerized commercial marine licensing system • Aquaculture	
	DLNR-Hawai`i Fisheries Coordinating Council	• Advise the DLNR on fisheries and coordination of fisheries among various federal, state, and county agencies and private industry	
	DLNR-Division of Boats and Ocean Recreation	• Issuance of Certificates of Number to vessels in state under 5 tons (see Table 4.3) • Investigation of boating accidents of recreational vessels • Issuance of marine/ shore water events permits, including vessels and participants • Issuance of revocable use permits for various small boat harbors • Fish Aggregation Devices (FADs) • Deepwater habitat enhancement • Fish toxicity tests	State marine waters
	Department of Transportation-Harbors Division	• Harbor facilities • Marine and Harbor Patrol officers • Launch ramp rules	State marine waters
	Department of Business, Economic Development and Tourism-Ocean Resources Branch	• Hawaii Ocean Resources Management Plan • Fisheries market promotions • Aquaculture	State marine waters
	Department of Agriculture	• Seafood Promotion • Non-indigenous species importation	State marine waters
	Hawai`i State Legislature Committees	• Rule-making through the Committee on Ocean Recreation and Marine Resources, Committee on Hawaiian Affairs	State marine waters
	Department of Health	• Water Quality Monitoring Program • Seafood Safety • Shellfish regulation and inspection	State marine waters
Local	County Parks and Recreation	• Facilities, Access and Service	County
	County-Public Works Department	• Wastewater treatment plants	County
Traditional[5]			

[4] For further information on laws granting these jurisdiction, see Table 4.1.

[5] See report text on Native Hawaiian Fishery Management (section 4.4).

Table 4.3 Hawai`i Troll and Handline Fishery: Databases and Reporting Requirements

I. Persons or Legal Entities

Data	Commercial Marine License[1] Database	Fish Catch Report[2] Database	Commercial Marine Dealer[3] Database	State Vessel, Registration Numbering Database	US Coast Guard Database[4]
CM License #	X	X	X		
Licensee Name	X	X			
Address	X			X	
Island Office	X				
Soc.Sec.#	X				
Sex	X				
Birthdate	X			X	
Height	X				
Weight	X				
Hair	X				
Eyes	X				
Resident Status	X				
Citizen Status	X				
Phone	X			X	
Fulltime Status	X			X	
Crew Status	X				
Charter Status	X				
Vessel Owner	X			X	X
Ves. Manag.Owner					X
Restrictions					X
Entitlements					X
Captain Name	X				
CML# of seller				X	

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[1] Hawai`i laws require that "no person shall take marine life for commercial purposes...without first obtaining a commerical marine license." *Hawaii Code 189-2* (where 'commercial purpose' is defined as the taking of marine life for profit or gain or as a means of livlihood where the marine life is taken in or outside the state, or where the marine life is sold, offered for sale, landed, or transported for sale anywhere in the state.)

[2] Every commercial marine licensee shall furnish to the department a report with respect to the marine life taken and any live, fresh, or frozen bait used for each month upon a form prescribed by the Hawai`i Division of Aquatic Resources. *Hawaii Code 189-3.*

[3] Every commercial marine dealer who engages in the business of buying or selling marine life or products taken within, or adjacent to, the waters of the state, shall render to the department...on or before the tenth day of each month on blanks to be furnished by the department, a true and correct statement showing the weight, number, and value of each of the species of marine life purchased, received or sold during the previous month. *Hawaii Code 189-10.* (Commercial marine dealer means any person who sells or exchanges, or who is an agent in the transfer of marine life obtained directly from a commercial marine licensee, or any commercial marine licensee who sells or exchanges marine life at retail.).

[4] With a few exceptions, all commercial vessels of 5 or more net tons which are used on the navigable waters of the U.S. must be documented by the U.S. Coast Guard. A recreational vessel may be documented if it is 5 or more net tons.

Table 4.3 Hawai`i Troll and Handline Fishery: Databases and Reporting Requirements (Cont.)

II. Vessels

Data	Commercial Marine License Database	Fish Catch Report Database	Commercial Marine Dealer Database	Vessel Numbering Database	US Coast Guard Database
Vessel Name		X		X	X
Vessel Reg. #	X	X		X	
USCG Vessel #	X				X
Homeport (place kept)	X	X		X	X
Gear	X	X			
Gross Weight					X
Net Weight				X	X
Length				X	X
Breadth					X
Depth				X	X
Hull Material					X
Place Built				X	X
Mortgage Info.				X	X
Type of Vessel				X	
Hull I.D. Number				X	
Hull Manufacturer				X	
Type of Fuel				X	
Principal Use					X
Radio Comm.					X
Number of Hulls					X
Colors					X
Engine					X
Propulsion					X
Sell Catch?					X
Trailer Boat?					X
Avg. # Passengers					X

III. Activity[5]

A. Harvest

Data	Commercial Marine License Database	Fish Catch Report Database	Commercial Marine Dealer Database	Vessel Numbering Database	US Coast Guard Database
Area Fished	X	X			
Buoy Fished		X			
Report Req.	X				
Date Fished		X			
Species Caught		X	X		
Number Caught		X	X		
Pounds Caught		X			

B. Distribution

Data	Commercial Marine License Database	Fish Catch Report Database	Commercial Marine Dealer Database	Vessel Numbering Database	US Coast Guard Database
Pounds Sold					
Pounds Bought			X		
Value of lbs. sold		X			
To Whom sold		X			
C.M. Dealer			X		
Date Bought			X		
Species Bought			X		
Value of lbs. bought			X		
# Bought			X		

[5] "Activity" includes the harvesting and distribution elements of the fishery, i.e. landings, effort (time and place), and purchase or sale of the catch.

Table 4.4 Western Pacific Regional Fishery Management Council Pelagic Management Actions and Activities

March 1980-November 1994

The pelagics are one of four groups of species over which the Council has management jurisdiction. The Western Pacific Regional Fishery Management Council also develops fishery management plans for bottomfish, corals, and crustaceans. Management of the Pacific Pelagic Management Unit Species (or PPMUS, see Table 3.1) involves developing a Fishery Management Plan and numerous other formal actions that are recorded in the Federal Register. Current pelagic issues are addressed at quarterly Council meetings held on different islands within Council jurisdiction. The meetings produce documents such as briefing books, supplementary information, agendas, and minutes. This table reviews formal Council actions on pelagics as recorded in the Federal Register and informal activities the Council performs on a continuing basis.

Formal Pelagic Management Actions

Federal Register Citation	Date	Action
45 FR 14581	3/6/80	Foreign fishing final regulations; implements PMP
45 FR 81633	12/11/80	Extends PMP indefinitely
46 FR 1738	1/7/81	TALFFs for 1981 and beyond
48 FR 32832	7/19/83	Lifts embargo on Pac. yellowfin imports from Spain
50 FR 18983	5/3/85	Notice of additional hearings on revised draft FMP
50 FR 19764	5/10/85	Notice of hearings
51 FR 29131	8/14/86	Notice of availability of the FMP
51 FR 32808	9/16/86	Proposed rule to implement FMP for the Pelagic Fisheries
51 FR 37924	10/27/86	Corrects 51 FR 32808
51 FR 41989	11/20/86	Withdraws proposed rule at 51 FR 32808
51 FR 45141	12/17/86	Amended proposed rule to implement FMP for Pelagics
52 FR 3079	1/30/87	Corrects 51 FR 45141
52 FR 5983	2/27/87	Final rule implements FMP for Pelagics
52 FR 10918	4/6/87	EFP application to harvest marlin, swordfish, & sharks with a drift gill net off Hawaii
52 FR 12641	4/17/87	Corrects 52 FR 5983
52 FR 17422	5/8/87	Hearings re domestic gill net permit application
52 FR 18411	5/15/87	Change of date for 52 FR 17422
52 FR 32015	8/25/87	Corrects 52 FR 5983
55 FR 27481	7/3/90	Proposed reg. amendment to require catch & effort data be reported to Hawaii, American Samoa, & Guam
55 FR 30491	7/26/90	Notice of control date for entry into Hawaiian longline fisheries
55 FR 42967	10/25/90	Final reg. amend. for state landing reports
55 FR 49285	11/27/90	Emergency rule estab. observer requirements for bottomfish & longline fisheries
55 FR 50755	12/10/90	Notice of availability of Amendment 1
56 FR 5159	2/8/91	Extends effective date of 55 FR 49285
56 FR 5802	2/13/91	Hearing re mgmt. measures to protect monk seal
56 FR 9686	3/7/91	Approval of Amendment 1
56 FR 11169	3/15/91	Notice of availability of Amendment 2
56 FR 12891	3/28/91	Clarifies control date for Hawaii longline: entry control date for longline around Amer. Samoa & Guam

Formal Pelagic Management Actions (cont.)

Federal Register Cit.	Date	Action
56 FR 9686	3/7/91	Approval of Amendment 1
56 FR 11169	3/15/91	Notice of availability of Amendment 2
56 FR 12891	3/28/91	Clarifies control date for Hawaii longline: entry control date for longline around Amer. Samoa & Guam
56 FR 13611	4/3/91	Proposed rule to implement Amendment 2
56 FR 14866	4/12/91	Emerg. rule estab. moratorium on new permits for Hawaii longline fishery
56 FR 15842	4/18/91	Emerg. rule estab. PSZ in NW Hawaiian Islands
56 FR 23735	5/23/91	Corrects 56 FR 15842
56 FR 24731	5/31/91	Final rule implements Amendment 2
56 FR 27558	6/14/91	Corrects 56 FR 13611
56 FR 28116	6/19/91	Emerg. rule prohibits longlines within certain areas of main Hawaiian Islands
56 FR 28718	6/24/91	Modifies & extends emerg. for HI longline moratorium
56 FR 30376	7/2/91	Notice of availability of Amendment 3
56 FR 31689	7/11/91	Corrects 56 FR 28116
56 FR 33211	7/19/91	Extends 56 FR 15842; modifies mgmt. measures in PSZ in NW Hawaiian Islands
56 FR 34049	7/25/91	Notice of availability of Amendment 4
56 FR 37023	8/2/91	Corrects 56 FR 24731 & 56 FR 33211
56 FR 37070	8/2/91	Proposed rule to implement Amendment 3
56 FR 37300	8/6/91	Modifies permit criteria for HI longline moratorium
56 FR 41643	8/22/91	Proposed rule to implement Amendment 4
56 FR 47163	9/18/91	OMB control no.; effectiveness of collection-of-information requirement
56 FR 47268	9/18/91	Corrects 56 FR 41643
56 FR 47701	9/20/91	Extends 56 FR 28116
56 FR 51849	10/16/91	Final rule implements Amendment 4
56 FR 52214	10/18/91	Final rule implements Amendment 3
56 FR 55651	10/29/91	Notice of availability of Amendment 5
56 FR 55652	10/29/91	Requests comment; criteria for modifications of longline fishing prohibited area
56 FR 58516	11/20/91	Effectiveness of CIR requirements for Amendment 4
56 FR 59896	11/26/91	Emergency rule; modification of longline closures
56 FR 60961	11/29/91	Proposed rule to implement Amendment 5
56 FR 63550	12/4/91	Corrects 56 FR 51849
57 FR 7661	3/4/92	Final rule implements Amendment 5
57 FR 10062	3/23/92	Corrects 57 FR 7661
57 FR 29692	7/6/92	Notice of availability of Amendment 6
57 FR 32952	7/24/92	Proposed rule to implement Amendment 6
57 FR 33716	7/30/92	Corrects 57 FR 29692
57 FR 33926	7/31/92	Proposed rule to reduce longline closures off windward side of Main HI
57 FR 35627	8/10/92	Corrects 57 FR 32952
57 FR 36637	8/14/92	Notice of control date for handline fishery off HI
57 FR 48564	11/27/92	Final rule to implement Amendment 6
58 FR 14170	3/16/93	Final rule revises gear ID requirements for longliners
58 FR 17642	4/5/93	Corrects 58 FR 14170
58 FR 26090	4/30/93	Proposed rule to remove Federal regs. governing foreign pelagic longlines off N. Marianas
58 FR 49438	9/23/93	Removes reg. re foreign longline for pelagics, other than tuna, off N. Mariana Islands and west coast

Formal Pelagic Management Actions (cont.)

Federal Register Cit.	Date	Action
58 FR 67699	12/22/93	Interim rule to make observer accommodations in limited entry longline fishery
59 FR 4898	2/2/94	Notice of availability of Amendment 7
59 FR 8896	2/24/94	Proposed rule to implement Amendment 7
59 FR 18499	4/19/94	Final rule requires notification prior to departure for observer placement
59 FR 26979	5/25/94	Final rule implements Amendment 7
59 FR 28449	6/1/94	Corrects 59 FR 26979
59 FR 40859	8/10/94	Pro. rule would implement experimental VMS program in pelagic longline fishery around Hawaii
59 FR 46933	9/13/94	Final tech. amendment corrects table coordinates
59 FR 58789	11/15/94	Final rule implements VMS requirements for Hawaii longline fishery

Informal pelagic activities:
This list is only intended to be illustrative, and is not an exhaustive list of Council activities regarding pelagics.

I. Scientific/Research Activities

- Development of social science priorities for pelagic management. *Social Science Research Priorities for Western Pacific Regional Fishery Management Council Fisheries: prepared by the Scientific and Statistical Subcommittee on Social Science, approved 11/94.*
- Development of biological and oceanographic research priorities for pelagic management (in progress).
- Participation in Pelagic Fisheries Research Program (PFRP).
- Participation in WPacFIN.
- Support of contract research and creel surveys.

II. Public Education Activities

- Circulation of meeting notes through quarterly newsletter.
- Publication of Fishing Profiles in Hawaii
- Small Boat Working Group Forum

5.0 HARVESTING ELEMENT

Three project fieldworkers asked open-ended questions of Hawai`i troll and handline fishermen in O`ahu and Hawai`i between August 1994 and March 1995 (survey instrument at Appendix 3). The interviews were conducted primarily at three sites on the two islands: Kewalo Basin (O`ahu), Hilo (Hawai`i), and Kailua-Kona (Hawai`i). Sample size (N) is 54. In addition, team members conducted informal interviews with several hundred fishermen and fishery managers throughout the course of the research. Information in this section consists of results from the formal survey and quotations from informal interviews. The survey results and the quotations illustrate the sociological distinctions necessary to understand the fishery. For an example of how the project goals were presented to fishermen, see the article from the *Hawai`i Fishing News* at Appendix 4.

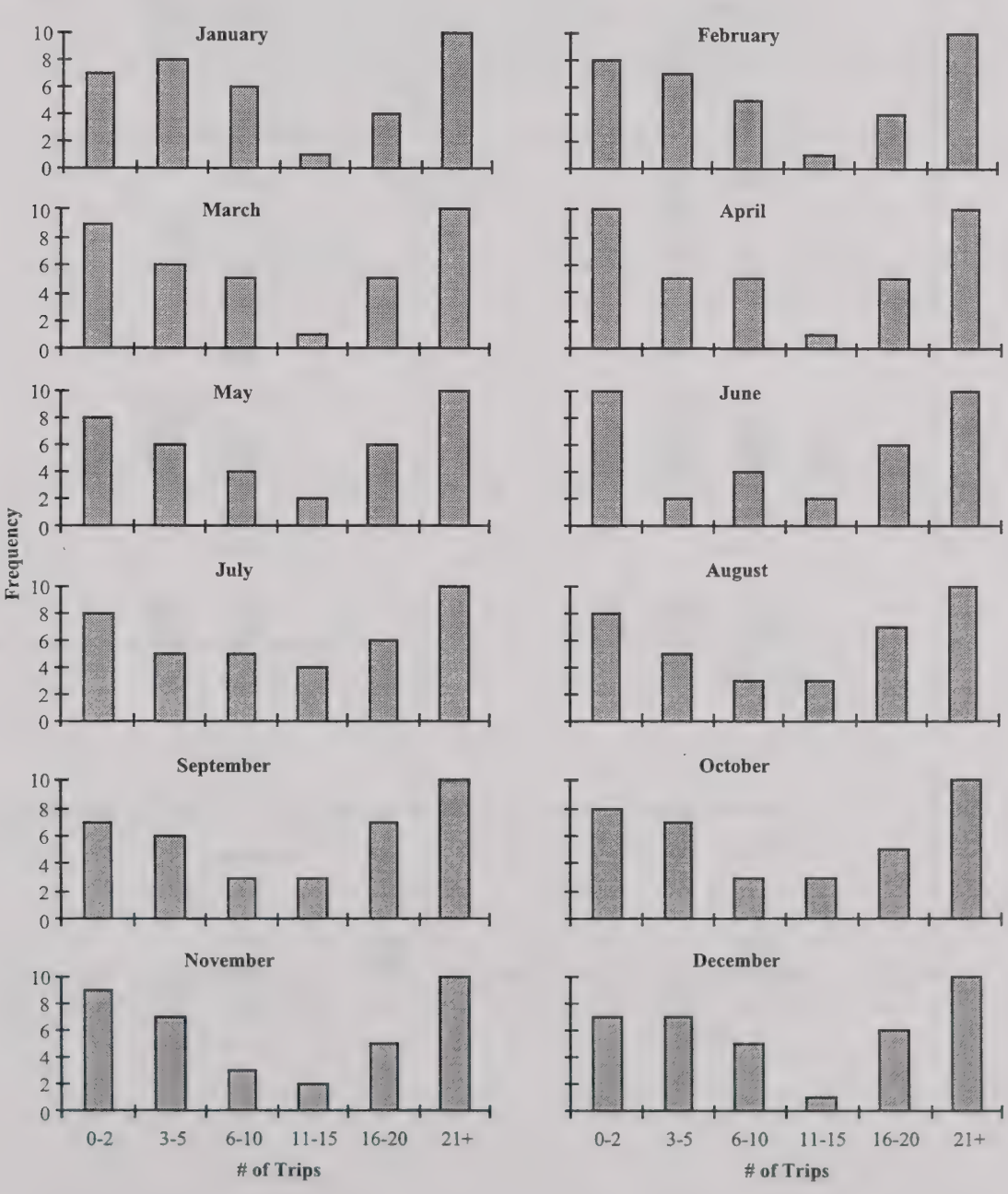
We have compared our survey results, where possible, to other relevant studies. Where comparison or distinction is obvious, we have included a note in the text. An annotated bibliography of these studies is in Appendix 5.

5.1 Fishing Patterns

5.1.1 Geartype and Seasonal Patterns

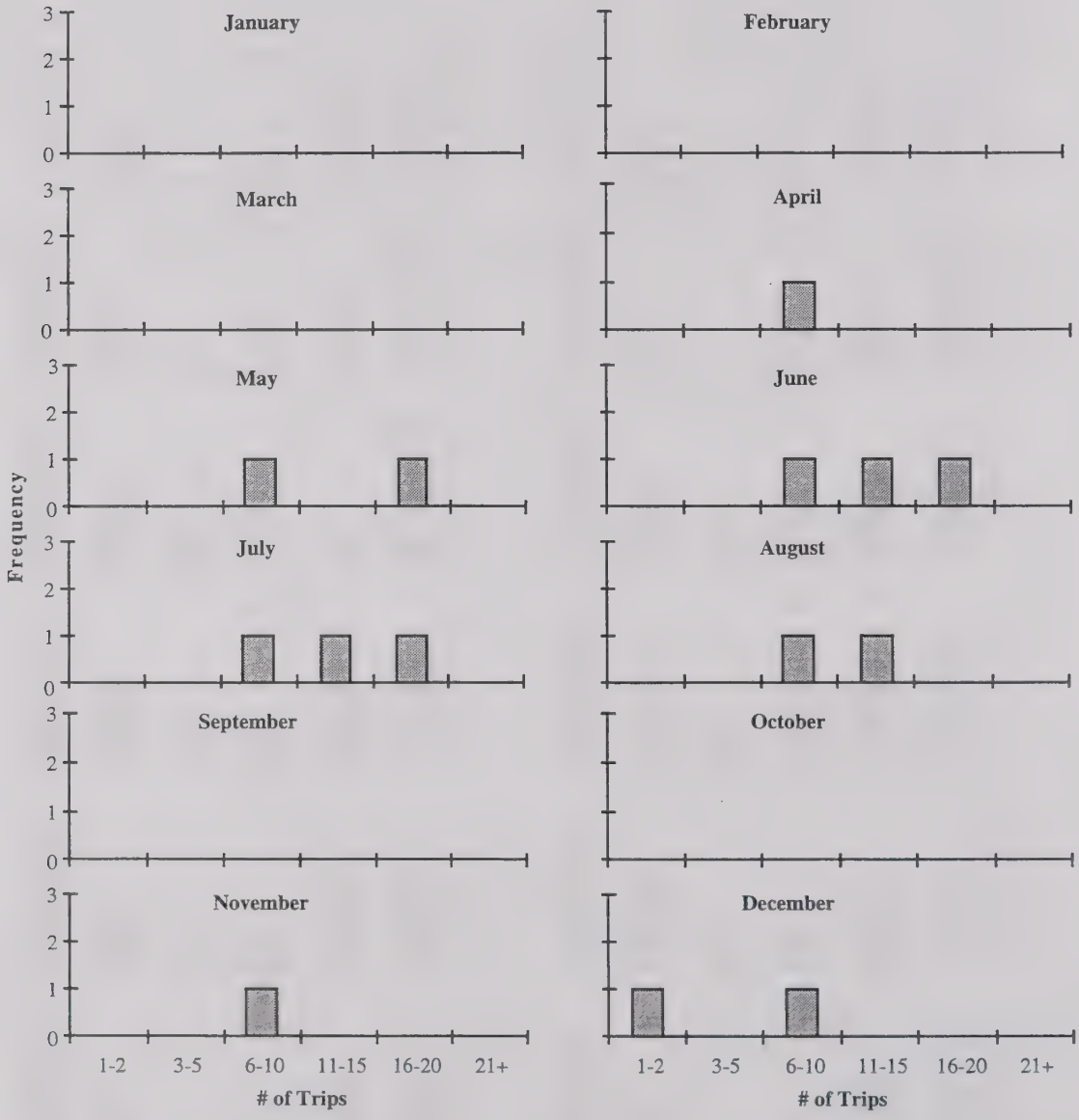
Question: *How many times each month last year did you fish for pelagics by trolling?*

Trolling



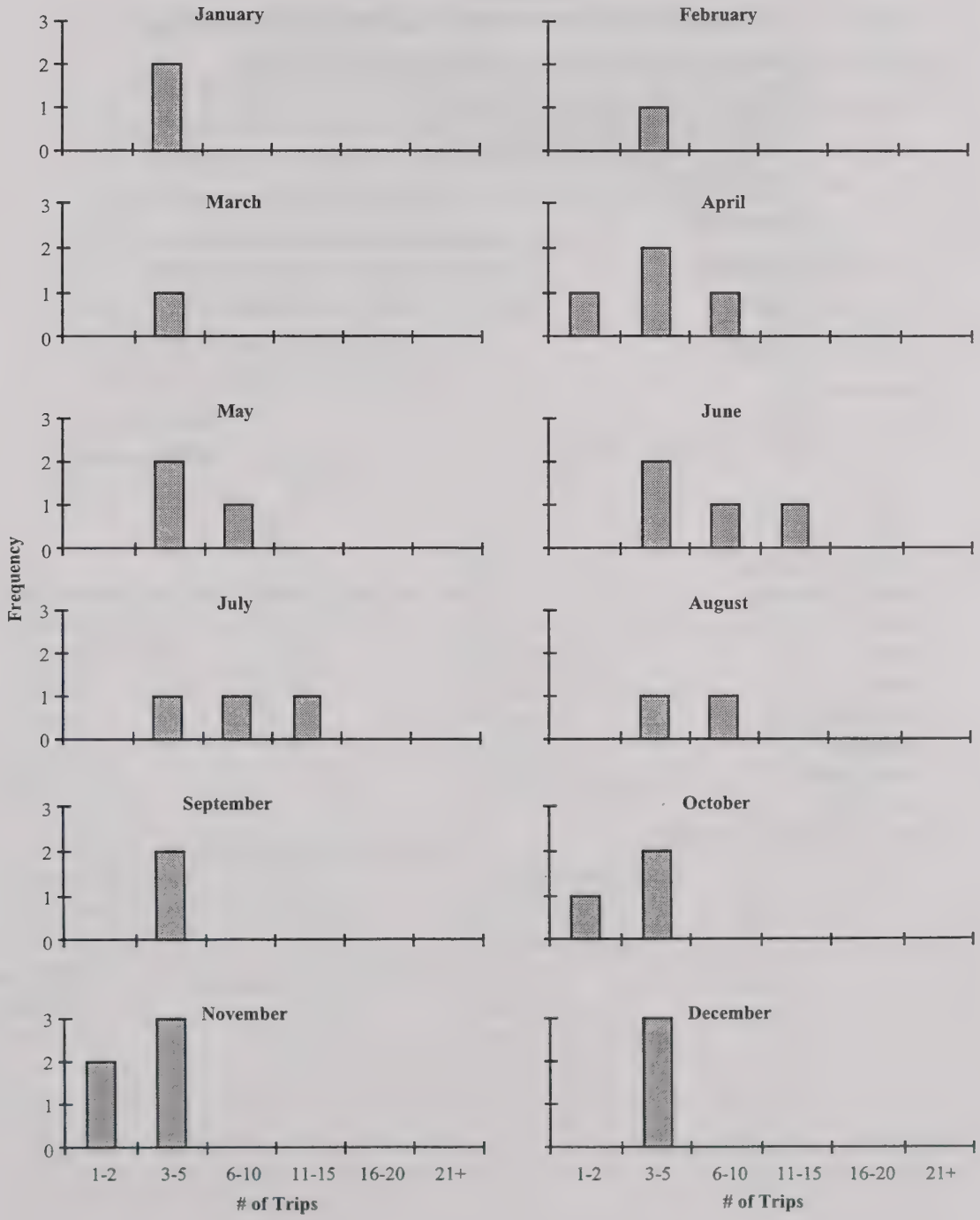
Question: *How many times each month last year did you fish for pelagics by ika-shibi?*
Note: These results indicate that ika-shibi fishermen represented a small portion of our sample.

Ika-Shibi

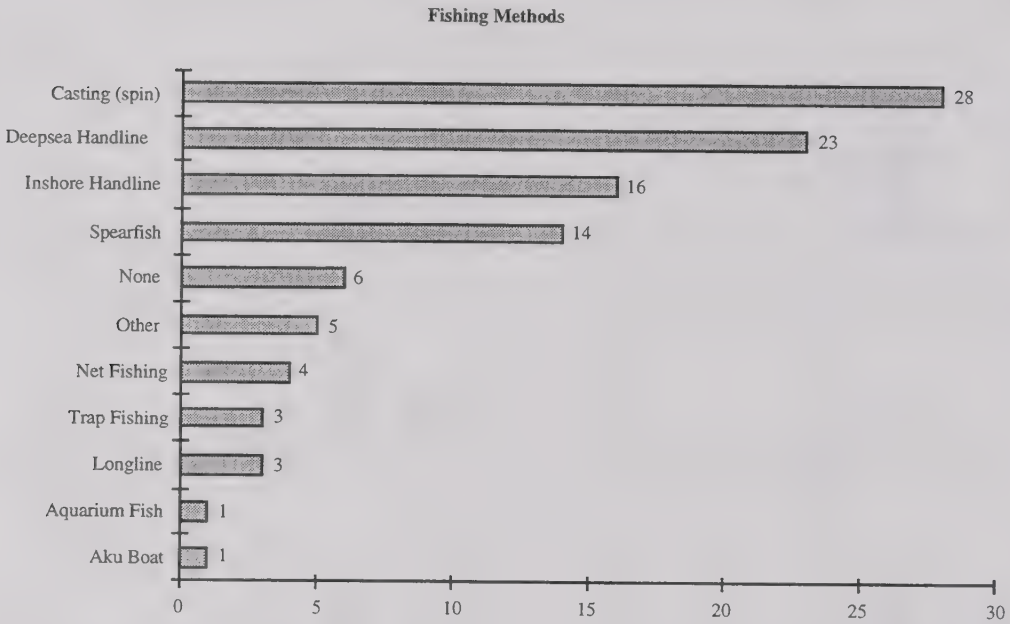


Question: *How many times each month last year did you fish for pelagics by palu-ahi?*

Palu-Ahi



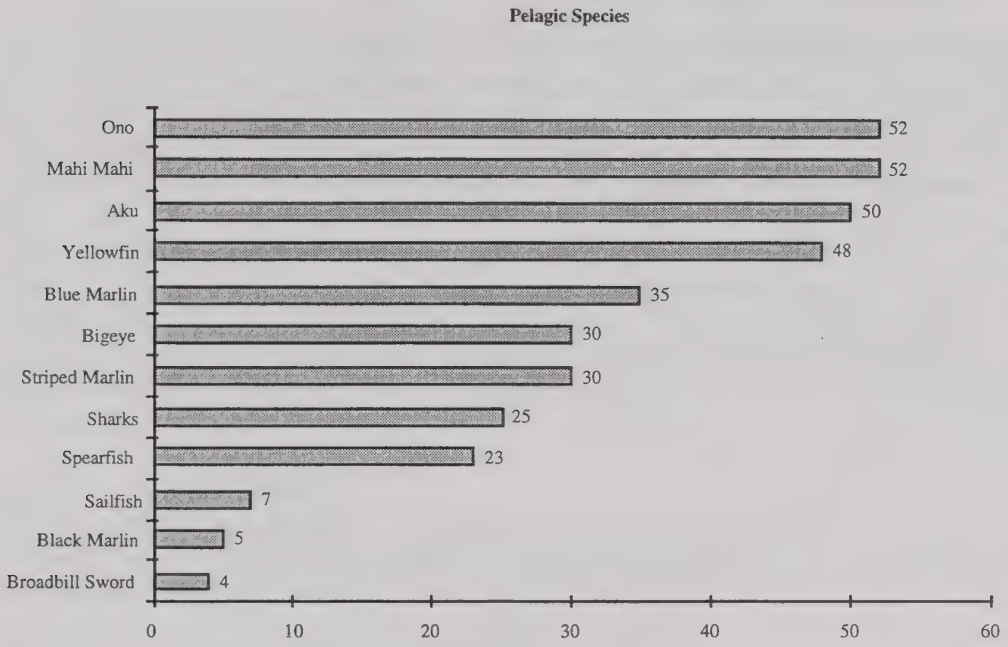
Question: *What other ways did you fish last year?*



Casting (spin)	28
Deepsea Handline	23
Inshore Handline	16
Spearfish	14
None	6
Other	5
Net Fishing	4
Longline	3
Trap Fishing	3
Aku Boat	1
Aquarium Fish Collecting	1

5.1.2 Species Patterns

Question: *Which pelagic species did you catch last year?*



9 respondents had the following combination:

yellowfin tuna (`ahi)	X	skipjack tuna (aku)	X
bigeye tuna (`ahi)	X	black marlin	X
blue marlin	X	striped marlin	X
ono (wahoo)	X	spearfish	X
mahimahi	X	sharks	X
sailfish		broadbill sword	

6 respondents had the following combination:

yellowfin tuna (`ahi)	X	skipjack tuna (aku)	X
bigeye tuna (`ahi)		black marlin	
blue marlin	X	striped marlin	
ono (wahoo)	X	spearfish	
mahimahi	X	sharks	
sailfish		broadbill sword	

Other combinations:

[Yellowfin + bigeye + aku] + billfish + other	14
[Yellowfin + bigeye + aku] + other (no billfish)	14
[Yellowfin + aku] + billfish + other	8
[Yellowfin + aku] + other (no billfish)	3
[Aku] + other	2
[Yellowfin + bigeye] +other (no billfish)	1
[Yellowfin] + billfish + other	1
[Yellowfin] + other	1
[Bigeye] + billfish+ other	1
[Bigeye + aku] + other	1
[Aku] + billfish + other	1
No tunas	1

5.1.3. Social Patterns—*Hawai`i Styles of Troll and Handline Fishing*

"The water brings people together."
—Eddie Nautu

A main objective of this study was to identify the social and cultural foundations of troll and handline fishing in Hawai`i. The central result in this regard is the discovery of a complex of what we term—in a sociological extension of the work of Rizzuto (1983, 1987)—*Hawai`i styles of troll and handline fishing*. These Hawai`i fishing styles can be understood in terms of their underlying 1) *situations*, 2) *social organizations*, and 3) *social and cultural processes*.

5.1.3.1. Fishing Situations

The analytical perspective of this project stresses the identification of social relationships that link people in *fishing situations* within and across the four elements of fisheries. Three overlapping species of situations—each with its own cultural milieu and sociology—are pertinent to the study of fisheries. These are labeled a) *fishing trips*, b) *fish selling and sharing*, and c) *fish talk*.

5.1.3.1.A. Fishing Trips

Fishing trips—like other kinds of human endeavors—are socially produced by a network of participants. In the technologically modern setting, trips are characterized by a division of labor fostering what Durkheim (1964) has called "organic solidarity."

For Durkheim, social life, depending on the society in question and moment in time, has as its foundation either mechanical or organic solidarity. The former depends upon the recognition "that there exists a social solidarity which comes from a certain number of states of conscience which are common to all the members of the same society" (1964: 109); the latter develops with personal expression and freedom of movement.

Fishing trips are the basic unit of experience in what might be called "the fishing world" or culture of fishing. This sociological orientation owes a debt to that used by Becker (1982) in the study of artistic production.

Fishing as an activity can be a (full- or part-time) vocation, a (routine or occasional) leisure pursuit, or a way of life. Individual fishing trips are three-dimensional experiences that provide combinations of commercial, recreational, and subsistence rewards. Importantly, a fisherman may begin a trip with one reward in mind, only to complete the trip with another evaluation. The relative importance of each dimension of fishing for a fisherman will determine how the trip is organized.

A fishing trip may be considered to begin when a captain begins to choose a reward structure, target species, and destination. This phase also entails selection of crew and the preparation of equipment. A fishing trip ends when the vessel and gear have been stored, and the captain, crew and other participants have finished their tasks. This also involves distribution of the catch.

A fishing trip is sometimes undertaken as one of a multitude of activities that are integrated in a larger effort such as a feast or party. While fishermen fish, other groups might collect *`opihi* (limpets) and other foodstuffs in preparation for a *luau*.

(Note: Phase I of this project is limited to a consideration of fishing trips. Phase II research will extend coverage to the other two situations, briefly described here.)

5.1.3.1.B. Fish Selling and Sharing

Returning from a trip, a fisherman has the opportunity to sell a portion (or all) of the catch, and/or eat or give portions away. The overall "value" of a trip for the fisherman and for others who are part of the social production involves assessments of the market value of the catch sold, the social and nutritional value of fish eaten or distributed among family and friends, and the recreational value of the experience.

It is a common for Hawai`i fishermen to distribute the first tuna caught each year with family and friends. In the words of one Wai`anae fisherman:

> *"We have a tradition. First to family and friends."*

There are times, however, when this generosity extends past the first fish. Referring to a friend who had caught an *`ahi*, a fisherman remarked:

> *"This guy says he's just going to cut up his fish and give it away. It's his second fish of the year and he's happy."*

In another interview, a troller told what he frequently said to his crew on trips that resulted in few fish:

> *"Let's just split everything up and give away."*

Contrasting fishing in Hawai`i with fishing in a variety of mainland states, one fisherman (who had moved to Hawai`i from the East Coast) commented in this way:

> *"Hawai`i does have a unique style. [This concerns ways] of setting gear, of [making and fishing] lures, of being social. Sharing the first `ahi. It's not a tradition, it's a requirement!"*

A long-time Kona Coast resident confirmed the practice:

> *"You've noticed the aloha around here. Unless you catch a ..[great amount] of fish basically what you catch is going to be eaten by your extended family."*

Another Wai`anae fisherman told of a long-standing symbiotic understanding in a nearby valley:

> *"[There is]..a reciprocity between farmers and fishermen... that continues today. These guys just aren't in it for the money."*

5.1.3.1.C. Fish Talk

By bringing people together and facilitating social interaction, fishing is a ritual that makes life meaningful. Fishing trip and fish selling and sharing experiences establish the foundations for subsequent social interaction. In Hawai`i, these experiences are cultural credentials for engaging in the ritual dialogue known as *talk story*. Although intangible, fish talk qualifies together with fishing *per se* and the exchange of fish as an important "value" of fishing. The ability to talk about fishing (minimally to be able to ask in an appropriate way about the fishing of others) is one defining attribute of what it means to be a member of Hawai`i society or, more generally, to be a Pacific Islander.

This section has taken the perspective that fishing in Hawai`i transcends the fishing trip and extends into the domains of fish sharing and talk story discourse. Island residents know about the place of pelagic fishing in Hawai`i culture even if they are short on details or do not fish themselves. As one resident put it:

> *"You get fishermen together, they always want to talk story."*

Indeed, fishing is a strong enough cultural theme that it is not uncommon for visitors to Hawai`i to presume that everyone involved in water-related work fishes. To illustrate, a Big Island dive instructor commented that tourists had posed to him any number of times variations on the question— *"You do fish, don't you?"*

5.1.3.2. Social Organization

The social organization of a fishery is a model of the ways individuals have affiliated with one another in moral communities. In the design of studies of social organization, two questions are addressed. The first of these concerns the *units of analysis* appropriate to the study. Studies can be planned to concentrate on individuals, on ethnic communities, on geographical communities, on formal organizations (based on government, religious, political, economic and other interests), on voluntary associations, on households, and so forth.

This research in this project was designed outward from the activity of fishing, what we have discussed above as fishing trips. The social organization of the Hawai`i troll and handline fisheries concerns first the backgrounds of individuals and also the assemblage of people who participate on fishing trips. For convenience, we refer to this unit as the *fishing crew*.

It is interesting to note that fishermen often employ the term "boat" when speaking of the particular crew aboard a vessel. In charterboat cases, credit for a successful trip can be attributed

to the skipper, the angler or both. One fisherman had this to say about a angler-skipper relationship:

> *"It's a group effort. Hank caught a fish. The angler brought the fish in, but Hank—the captain of the boat—gets the credit. Sometimes the captain is not mentioned. The boat caught the fish."*

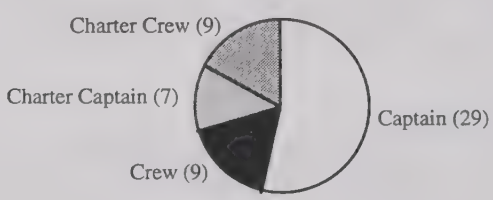
While Hawai`i fishermen may talk in terms of a "boat" fishing, they are keenly aware of the people aboard and their individual contributions. (For a discussion of problems that can ensue if the term "boat" is taken literally rather than figuratively by fishery analysts, see Miller and Van Maanen, 1979.)

Another question of social organization concerns the *social relations of interest*. Whether on teams, in clubs, or on boats, people can be linked by a great variety of kinship, professional, and other ties. In this research, no category of tie was *a priori* singled out to define the study. Rather, the identification of the range of ties between people fishing together was a project objective.

5.1.3.2.A. Backgrounds of Fishermen

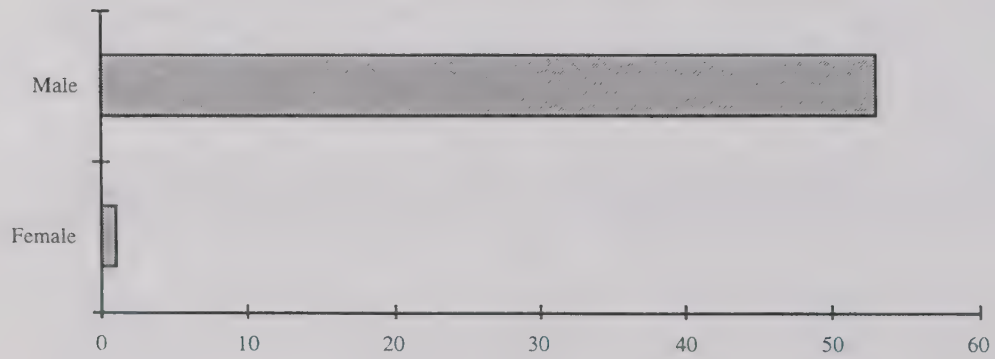
Question: *Professional Status*

Captain	29	Crew	9	Charter Captain	7
Charter Crew	9				



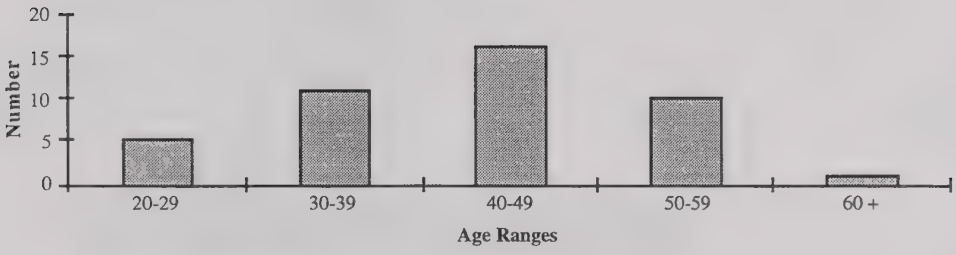
Question: *Gender*

Male	53	Female	1



Question: *Age*

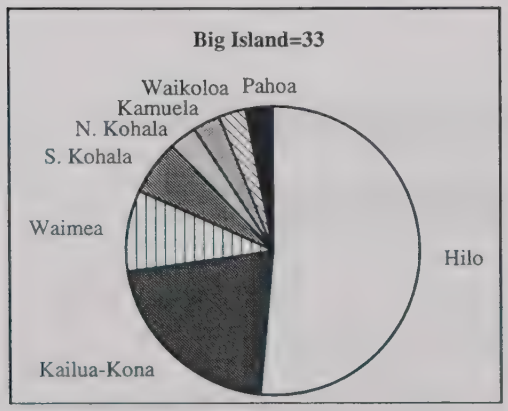
20-29	5	Range	21-61
30-39	11		
40-49	16	Average	38
50-59	10		
60 +	1		

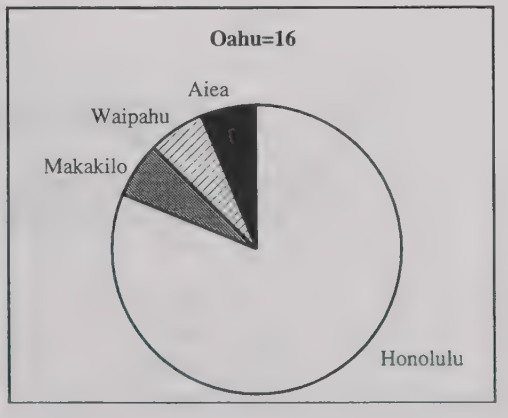


Question: *City, State, and Country of Residence*

Big Island = 33 O`ahu = 16

Hilo	17	Honolulu	13
Kailua-Kona	7	Makakilo	1
Waimea	3	Waipahu	1
S. Kohala	2	Aiea	1
N. Kohala	1		
Kamuela	1		
Waikoloa	1		
Pahoa	1		





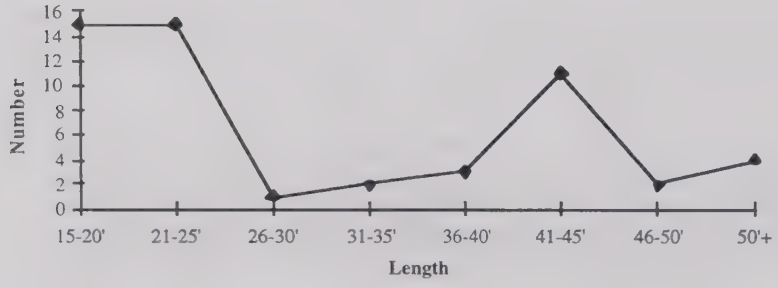
Question: *Primary and Secondary Occupation*

Primary Occupation	
Charter Fisherman	20
Fisherman	5
Dive Instructor	4
Chef	2
Mechanic	2
Supervisor	1
Retired	1
Restaurant	1
Professor	1
Assistant Professor	1
Self Employed	1
Instructor	1
Engineer	1
Draftsperson	1
Stock Clerk	1
Farmer	1
Unemployed	1
"County"	1
"C. of H."	1
State M.P. Office	1
Social Worker	1
Fishing Tackle Owner	1
"Master"	1

Secondary Occupation	
Fisherman	8
Boat Maintenance	2
Scuba Equip. Retailer	1
Boat Broker	1
Restaurant Owner	1
Mechanic	1
Teacher	1
Bakery	1
Property Owner	1
Rock Carver	1
Charter Captain	1
Message Therapist	1
Sailboat Crew	1
Food & Beverage	1
Student	1

Question: *Boat Length*

Boat Length



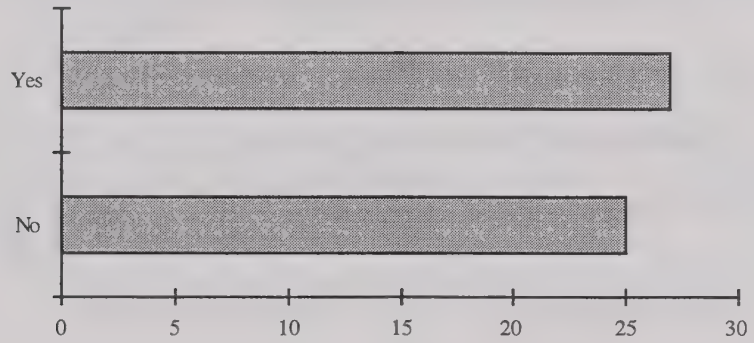
15-20'	15	36-40'	3
21-25'	15	41-45'	11
26-30'	1	46-50'	2
31-35'	2	50'+	4

Question: *Do you own the boat you fish on?*

Note: The mail-in study conducted by Harman and Katekaru (1988) found a majority of respondents to be boat owners. This is likely because the surveys were mailed to commercial marine license holders. Our sample is distinct in this way from previous samples based on documented fishermen.

Yes	27	"Most of it"	1
No	25		

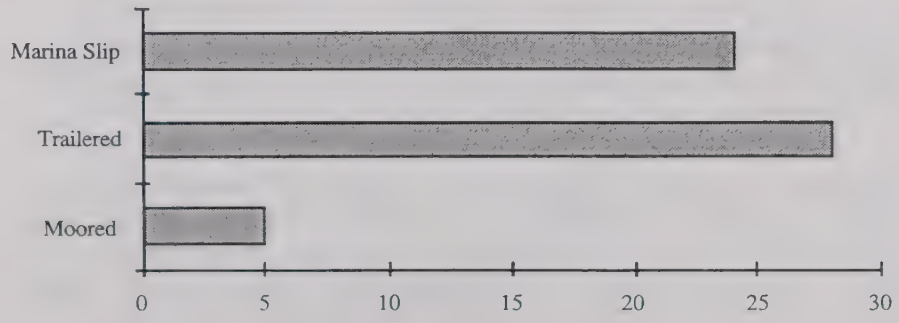
Boat Ownership



Question: *Is the boat you fish on:*

Kept in a `marina slip?	24
Trailered to fishing locations?	28
Moored (buoys) in a marina or bay?	5

Boat Storage



5.1.3.2.B. Fishing Crews

Fishing trips are social productions of fishing crews. "Crew" is used here as a mass noun and taken to include the captain. In the contemporary Hawai`i troll and handline fishery, individuals often perform different tasks on a regular basis. For our purposes, all persons (including, for example, elders, guests, children and others who may not technically harvest fish) on a vessel are *de facto* crew. Trips can also involve persons who assist in fishing-related jobs ashore (for example, those who are responsible for gear maintenance, information gathering).

A typology of social relations includes:

- the egocentric relation (*e.g.*, a fisherman who fishes alone)
- the business relation (*e.g.*, a captain who fishes with commercial fishing crew)
- the service relation (*e.g.*, a captain and crew who charter a boat to a sportsfishing angler)
- the friendship relation (*e.g.*, a captain who fishes with friends or non-fishing business associates)
- the family relation (*e.g.*, a captain who fishes with family members)

Question: *Please give a specific example of the relationships linking the people who fish with you. Using lines and labels (for example, friend, father, son, wife, business partner, boss or employee, or associate, acquaintance, etc.) diagram how people on the boat that you fish on know one another. Be sure to show how all people aboard—including those (small children, guests, elder) who may not be "fishing"—are tied to one another.*

A sample response to this problem resembles the following:

person #1
me

person #2
Dad, 46, angler

person #3
cousin, 26, angler

person #4
uncle, 50, angler

person #5
friend, 23,

person #6
crew

Analysis of responses to these questions show that troll and handline crew structure is based on three kinds of social relations. The social organization of crews can reveal a *family structure*, a *friendship structure*, an *enterprise structure*, or a *combination structure*.

These structures have Hawaiian counterparts. *`Ohana* can be translated as "family," or "kin group." *Hui* can be taken to mean "club," "association," "corporation," "company," "firm," and "partnership," among other collectivities of people organized for a purpose (Pukui, 1986). *Hoaloha*, *makamaka*, and *aikane* are some of the words for friend. One translation of the word "fishery" is *`oihana lawa`a* (Hitchcock, 1974 [1887]). Pukui (1986) translates *`oihana* as meaning "occupation," "rite," and "position" among other things; *lawa`i* can mean "fisherman" as well as "to catch fish."

In Hawaiian, as in English, it can be difficult to specify how people are connected to one another with a single term. Thus, terms such as "family," and "friend" are used with flexibility to meet the situation at hand. A popular band in Hawai`i is known as *Hui `Ohana*. A group of fishermen could as easily be referred to in the same way.

i. `ohana structure

An illustration of *`ohana* or family fishing is provided by the an O`ahu smallboat troller who often fishes alone, but who is accompanied by members of his family when the occasion permits. The youngest son has gone fishing with his father since he was six months old. Referring to his son, now five years of age, the troller noted with satisfaction:

> *"The most enjoyable part for him is ten fish in my live bait well."*

ii. hui structure

Hui structured fishing refers to fishing that involves a crew organized to a common, financial purpose. In the strictest sense, this is illustrated by "commercial" fishing where fishermen only have a business relationship linking them. One O`ahu troller fishes with his family by

preference, but when fishing is good he recruits a crew from the area. Sometimes he is forced to fish with a crew he does not know well:

> *"You gotta screen that pool because you don't want it to mess up your day."*

iii. hoaloha structure

Hoaloha crew structures pertain to those situations in which fishermen share a bond of friendship. Generally, friendships are the basis of recreational and sport fishing.

iv. combination structure

Crew structures of the *combination* type are common in the Hawai`i troll and handline fishery. These emerge when the sociological relationships linking fishermen involve aspects of kinship, friendship, and business. One O`ahu troller interviewed fishes part-time some 70 times per year. His crew consist of men in other lines of work that he has known for many years:

> *"We are hard core. We always fish at least once on weekends unless there is bad weather or social obligations. One [crew] gets the lunch, another the ice, and I'm the boat. We don't even have to talk. Everyone knows what to do. You learn a lot about your friends over the years. You see them under many conditions. If we catch fish, that's great. If not, that's great too."*

Pure Structures

Family (*`ohana*) structure	2
Friend (*hoaloha*) structure	6
Enterprise (*hui*)	1

Combination Structures

Friend and Family structure	6
Family and Enterprise	2
Friend and Enterprise	2
Friend, Family and Enterprise	1

Question: *What fishing clubs and/or associations do you belong to?*

Hilo Trollers	19
None	23
International Gamefish Association	6
Billfish Foundation	3
Big Island Fisherman's Association	2
Hawaii Yacht Club	2
Boat U.S.	1
AFS	1
Hawaii Fishermen's Foundation	1
Kawaihae Trollers	1
Hawaiian Fishing Association	1
North American Fishing Club	1
Bass Anglers Sportsman Society	1
PORF	1

Question: *How many pelagic (for example, tuna or billfish) tournaments do you enter in a year? Which ones?*

none	14	six	5
one	9	seven	4
two	5	eight	2
three	2	ten	1
four	4	twenty	1
five	5		

Hilo trollers jackpot	16	Various yacht club jackpots	1
Lahaina Jackpot	13	Kihei jackpot	1
Senoritas	7	Okoe Bay	1
HIBT	6	Dirty Dozen	1
Hoolea	6	Kawaihae trollers	1
Alha Jackpot	4	"Go for Broke"	1
Wahine Jackpot	3	Safeway Tournament.	1
Ali`i Kai	3	Kihei Boatclub Jackpot	1
Wee Guys	2	N. Shore Hanapaia	1
"all flag fish"	1	KHBT	1
"all"	1	Howard Hose Invitational	1
All Hawaii Tourney	1		

5.1.3.3. Social and Cultural Processes

A central question in fishery management concerns the value of fishing to those who fish and to society. This question can be answered in a number of ways. Fishing is important because it provides nutrition. In the harvest of commercial and recreational fishery resources, and in the processing, marketing and delivery of the products to consumers, the fishing industry generates jobs and contributes to local, national and international economies.

From a sociological and cultural point of view, the significance of fishing to fishermen is found in the importance of the social action it facilitates and the symbols it creates. Simply stated, fishing brings people together in the pursuit and exchange of fish and this underwrites the social order and provides meaning in life.

One way troll and handline pelagic fishing brings people together in Hawai`i is that it provides an opportunity to sell fish, to make a profit and an income. But it is a almost a proverb in Hawai`i that fishing is more than a money-making activity. It is often pointed out that fishing draws people—family and friends come quickly to mind—together for recreational and sporting experiences. Yet, as one fisherman noted, this too misses the essence of fishing in the Hawaiian Islands:

> *"In Hawai`i, fishing's a way of life. It's not [merely] a sport."*

5.1.3.3.A. Fishing Motivations

One of the most difficult problems in the social sciences concerns the motivations of people. March (1991; 4) has described the "rational model" of economic research in the following way:

> "In a rational process of action, we imagine 1) that there is a set of alternatives, 2) that those alternatives are associated with their future consequences, 3) that those consequences are evaluated in terms of a set of preferences, and 4) that the alternative selected is characterized by a set of expected consequences that are the best possible as evaluated by the preferences."

The rational model—whether used by a social scientist or layperson—makes the assumption that people under study engage in thinking about how various ends are associated with means. Everyday experience validates this model when we recognize those situations in which people are deliberately "deciding" to behave in a particular manner.

The general application of the rational model comes into question when individuals under study are unsure as to whether or not they "made a decision." It is not uncommon for people to discover that they cannot quite recall making a particular decision concerning, for example, why they dressed in a certain way or behaved in particular manner. When pressed for an explanation by other members of society, people sometimes respond with a rationalization. It might be suggested, for example, that a decision was made, but that the individual was thinking so quickly that the decision-making process was "unconscious," or too short to be noticed, or made in an earlier time period.

One of the reasons for the non-academic popularity of the rational model is tied to the fact that western society does not have an organized terminology for discourse concerning intelligent behavior that is not rooted in decisions. Generally, we are not permitted to say we do not know why we acted in a certain way. To not know is to be irresponsible or inappropriately inattentive.

An alternative to the rational model is the "ritual model." As used here, the ritual model is taken to encompass a host of explanations for social action that emphasize the process of involvement *per se* over any initial decision to pursue a course of action. The ritual model fits those situations in which people account for their behavior by invoking the cultural mandates of "routines," "customs," "habits," and "traditions." March (1991, 13) introduces a preliminary listing of such "other kinds of logics" that contrast with the procedures of rationality in the following way:

> "For example, there is the *logic of imitation* by which an action is taken because it conforms to the actions of others. There is a *logic of experience* by which an action is taken because it has been reinforced in the past. There is a *logic of appropriateness* by which an action is taken because it is appropriate to an identity in a situation. There is a *logic of faith* by which an action is taken because of confidence in the superior wisdom of prophets or experts. Each of these has some serious claim to being a better descriptive characterization of human behavior than is calculated rationality." (emphasis added)

To this list, a *logic of experimentation* may be added in which an action is taken because it provides an opportunity for free-form exploration.

In summary, fishermen's motivations can be analyzed in complementary ways with rational and ritual models. The rational model is useful when fishermen self-consciously make decisions about the rewards they want and the means to achieve these. The ritual model is useful for accounting for continued commitment to a style of fishing when decisions are difficult to isolate. The following exchange between an interviewer and a renowned fisherman made this clear:

> *Interviewer: "Why do you fish?"*
> *Fisherman: "What a stupid question!"*

In the production of Hawai`i styles of fishing, both models are operative. Some fishermen—for example, self-described "commercial" and "professional" fishermen—exhibit an instrumental orientation to fishing and are explicit about goal of profit. Their primary motivation is captured with a rational model and ritual benefits (e.g., friendships, aesthetic experiences) are secondary. For other fishermen—for example, self-described "recreational" fishermen—the relative contributions of the models are reversed. Finally, there are fishermen who fish with different motivations on different fishing trips.

i. Ritual Production of Fishing

Fishing is an interaction ritual that produces moral and social solidarity. A simple representation of this process is provided in Model 5.1. The model is a modified fishing variant of a general neo-Durkheimian model discussed by Collins (1988: 188-197; see also Durkheim 1964 [1893]).

Requirements

The model begins with (1) people together experiencing a (2) common focus and (3) mood. In subsequent iterations they also draw upon a (4) common ritual database.

In pelagic fishing, people come together in the planning of a trip, in the activity of fishing itself, in the cleaning-up process at the end of the trip, and in the distribution of the catch. At each stage, fishing offers opportunities for those involved to develop a common mood—excitement and anticipation at the outset, perhaps disappointment at losing a fish, appreciation of a fellow fisherman's competence, etc. If people have fished together in the past, memories of those experiences become part of a ritual database. These can be drawn upon to in the course of fishing and conversation.

Social Action

Once the requirements of the model have been met, the process of social interaction can stimulate (5) a shared awareness and (6) definition of the situation, and (7) the generation of emotional energy.

As a pelagic fishing trip unfolds, fishermen can discover that they share the same mood, focus, and some experiences and memories. Fishermen can also develop a common understanding as to

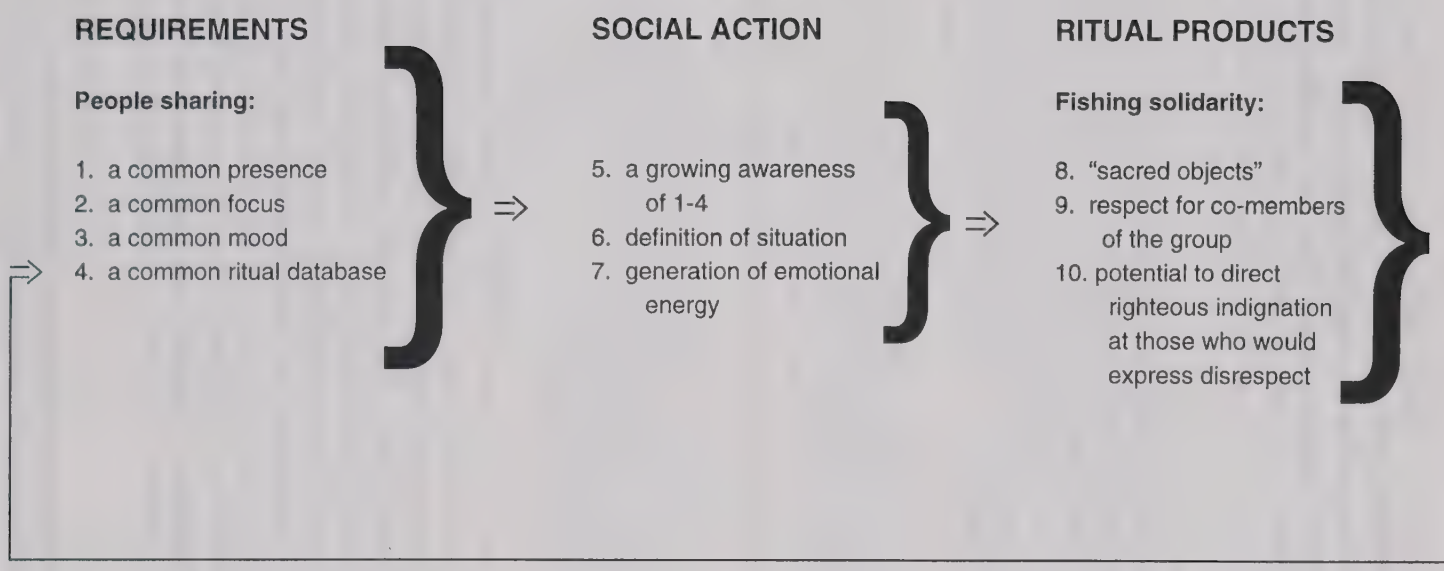
what, for example, might be accomplished on the trip. Sometimes fishermen begin a trip thinking more about recreation than profit only to realize both after finding fish.

Ritual Products

Fishing has the potential to generate three kinds of products that contribute to moral and social solidarity. First, fishermen create (8) "sacred objects." These can be physical symbols such as the fish caught or lost, particular pieces of fishing equipment such as an expensive reel or a unique kind of gaff, linguistic symbols such as names for favorite fishing spots, secrets of technique, and so forth. (As Collins [1988: 203-208, 250-255] has noted, Goffman [1959, 1967] has effectively demonstrated that in everyday rituals sacred objects can be extended beyond things, artifacts, actions, and ideas to include the self and others.)

Second, fishing allows fishermen to develop (9) respect for themselves as individuals and for other members of the fishing group. This can occur as fishermen show their expertise and achieve fishing goals.

Finally, fishing can lead fishermen to manufacture and direct (10) righteous indignation at those who would express disrespect for the fishing ritual. This happens when fishermen discover that their style of fishing or motive is unappreciated by others. Recreational fishermen, for example, are sometimes portrayed as lacking fishing knowledge; commercial fishermen are sometimes stereotyped as being uncommitted to conservation practices.


REQUIREMENTS
People sharing:
1. a common presence
2. a common focus
3. a common mood
4. a common ritual database
SOCIAL ACTION
5. a growing awareness of 1-4
6. definition of situation
7. generation of emotional energy
RITUAL PRODUCTS
Fishing solidarity:
8. "sacred objects"
9. respect for co-members of the group
10. potential to direct righteous indignation at those who would express disrespect

Model 5.1 Ritual Production of Fishing Solidarity

ii. Sacred Objects

The sacred objects of Hawai`i styles of troll and handline fishing function in the ritual model to generate feelings of group membership, and ultimately purposes of life. Profit can be treated as a sacred object in applications of the ritual model, and, as is well known, it can also can play an important part in the construction of rational models. Two other currencies in the ritual production of Hawai`i fishing pertain to a) social identities and b) fishing styles.

Social Identity

Understanding the range of images Hawai`i fishermen have of themselves is as important in fishery management as understanding diversity of the fishery resources. The question "What kinds of fishermen are there?" can be answered with reference to geography (*e.g.*, "Big Island fishermen'), technology (*e.g.*, "troll fishermen," "small-boat fishermen"), biology (*e.g.*, "*`ahi* fishermen"), and ethnicity (*e.g.* "Native Hawaiian fishermen"). The question can also be answered with reference to motivation (*e.g.*, "commercial fishermen") and occupational commitment (*e.g.*, "part-time fishermen").

These different ways of classifying fishermen can be useful for certain purposes. In particular, they can help in analyses that require aggregate data. Given a definition of "small-boat" and an assumption about how the average crew size, the sum total of small-boat fishermen provides a measure of potential fishing effort. However, these categories—because they are based on features of vessels, fish, gear and individuals—are of limited usefulness in understanding the sociology of fisheries.

Some progress in the development of a sociological vocabulary of fishing has been made in recent years. Miller and Van Maanen (1982), for example, have argued for the use of terms that make reference to social *relationships* rather than personal or bio-technological characteristics. Their conceptualization of a fishing *social identity*:

> "...refers to a particular social role that an actor fully embraces, supports, and seeks to affirm in social situations. It may be based on occupational activities, leisure interests, or family ties, and it may be presented well or poorly. From the individual's perspective, social identity reflects a congruence presumed by the individual as to the kind of person others take him or her to be by virtue of his or her situated, public conduct, and the kind of person the individual considers himself or herself to be. The claiming of social identify entails behavior that falls somewhere between what is conventionally defined as personal or personality-based behavior and functional or role-based behavior. The notion allows relatively fine-grained distinctions to be made among actors who fill the same formal role, yet stops short of requiring a depth psychology of personal character where the role itself vanishes from view and only the idiosyncratic aspects of a social actor's personality remain." (1982:29)

Examples in New England include the social identities employed by traditional fishermen (*e.g.*, "Cape Codders," "Guineas") and non-traditional fishermen (*e.g.*, "outlaws," "seasonal") (Miller and Van Maanen, 1982).

Fishing Styles

We introduce the concept of *fishing style* in order to examine the quality of fishing trips as these are experienced by fishermen. As used here, style covers the motivations and rewards that fishermen see as responsible for their commitments to fishing. (For a discussion of the styles of fishery managers, see Miller and Gale, 1986). An inventory of fishing styles is employed by fishermen to communicate the character of fishing trips. The vocabulary of fishing modes is also a shorthand for social network configurations. To the extent fishing trips are analyzed as "work," fishing styles point to variations on the "division of labor" theme.

In a manner of speaking, locally available fishing styles exist on fishing trip menus. Fishermen's behavior in the planning of trips can be modeled as nested routines and decisions. The distinction between fishing "routines" and fishing "decisions" corresponds to the difference between the culture and sociology of fishing on the one hand, and the economics of fishing on the other. To an anthropologist or sociologist, people's daily routines are analyzed as ritual productions; to an economist, people's daily behavior is modeled as consisting of decisions rationally produced through the comparison of individual preferences

Some fishermen change on a daily basis the category of fishing experience they will pursue. A fisherman, for example, might fish for profit when conditions are perfect. When conditions are less ideal, the same fisherman might focus on recreational or aesthetic amenities.

The fishing that people do varies with the ways they are connected to the fishing industry, or world. But, this does not mean that the form of their participation can be seen directly in the type of vessel and gear used, or in the final result—catch. (That fishing has form as well as product brings to mind Kubler's argument [1962] that art has morphology as well as meaning.) When a fisherman develops a strong pattern of fishing in a particular way, the concept of fishing style can be used to reflect on the individual in much the same manner as social identity. Thus, a fisherman who invariably takes "recreational fishing trips" comes to be regarded by himself or herself, or by others as a "recreational fisherman."

Fishing styles resemble what Becker (1982: 227) has called "relational terms" in that they do not so much describe people as they show how people stand in relation to an organized fishing industry. They make sense to fishermen in that they highlight both examples of—and departures from—canonical fishing. Looking to the occupational side of fishing, the canonical fisherman exhibits the non-controversial style of someone fully supported by the industry. In Becker's (1982: 229) terms, such a fishermen would be called an "integrated professional."

Fishing style conflicts in fisheries occurs when the legitimacy of one style is challenged by those endorsing another. Not infrequently the basis of the conflict centers on motivational differences as, for example, when "commercial" fishermen challenge "sport" fishermen.

5.1.3.3.B. Four Hawai`i Styles of Fishing

With the ritual model, fishing trips provide opportunities for the development and maintenance of relationships. In Hawai`i styles of fishing, sacred objects such as social identity, fishing style, and profit contribute to characterize both the trip itself and the fishermen involved.

The four basic Hawai`i styles of troll and handline fishing are labeled as *holoholo* fishing, *kaukau* fishing, *expense* fishing, and *profit* fishing. As will be seen, these terms roughly correspond to "recreational/sport/fun," "subsistence/food," and "commercial" fishing. In the words of a Big Island fisherman:

> *"Around here you could just say holoholo and kaukau. The people would have no trouble talking."*

i. Holoholo Fishing

Holoholo fishing is the Hawai`i formulation of recreational fishing in the sense that travel is a salient motive. Holoholo fishermen value the aesthetic, sporting, social, familial, and isolationistic aspects of fishing. Tournament or competition fishing are variations on the holoholo theme as is fishing for fun. One fisherman remarked in an interview that he thought he might *"go holoholo today just to get away."* When asked if he considered it important to sell what he might catch to pay for fuel, he commented that that was not part of his motive:

> *"If you're worried about expense, you're in the wrong game. That's why it's called fishing and not catching."*

ii. Kaukau Fishing

Kaukau fishing is the Hawai`i variant of fishing for food or subsistence. By definition, kaukau fish are not sold. Kaukau fishermen often have cultural and social obligations to share fish with family and others. One fisherman defined kaukau fishing this way:

> *"We go take home fish for eat."*

iii. Expense Fishing

Expense fishing arises from the motive of wanting to sell enough of the catch to cover the prices of fuel and provisions. Expense fishermen respond pragmatically to costs incurred by fishing recreation and leisure.

The term for this kind of fishing motivation came from an O`ahu fisherman:

> *"Call it expense fishing. Let's go out and catch fish to meet expenses.*

A fisherman interviewed on O`ahu told the story of how he had originally started fishing strictly for recreation, but quickly learned that it was too expensive to be a "pure recreational fisherman:"

> *"If you want to recreational fish, you got to make money to cover costs plus. Otherwise, just sell your boat."*

iv. Profit Fishing

Profit fishing can be a part- or full-time activity. Profit fishermen—whether they sell a product or a service (as do charter/party boat skippers) or both—are committed to fishing as an occupation or profession.

v. Combination Fishing

Talking with fishermen, it soon became apparent that not only do individuals fish in different ways on different days, they may change their fishing goals in mid-trip. One fisherman commented that it was common for him to *"go holoholo fishing and catch kaukau fish."* The same fisherman then created a scenario if which an imaginary fisherman took a trip with holoholo, kaukau, and expense dimensions: *"[You could do] it all that on one day on a boat."*

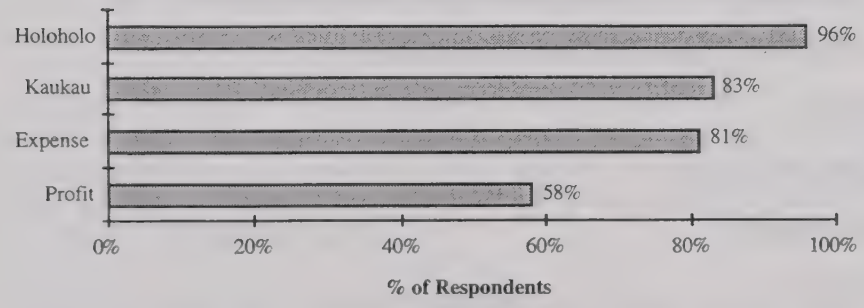
Question: *Which of these kinds of fishing did you do last year?*

holoholo ("recreational") fishing	96%
kaukau ("food") fishing	81%
expense ("pay for gas & supplies") fishing	83%
profit ("commercial") fishing	58%

Note: The percentage of respondents who claimed to fish for profit is compatible with those who claimed to gross 5% or more of their yearly income from fishing (See next question).

Combinations:

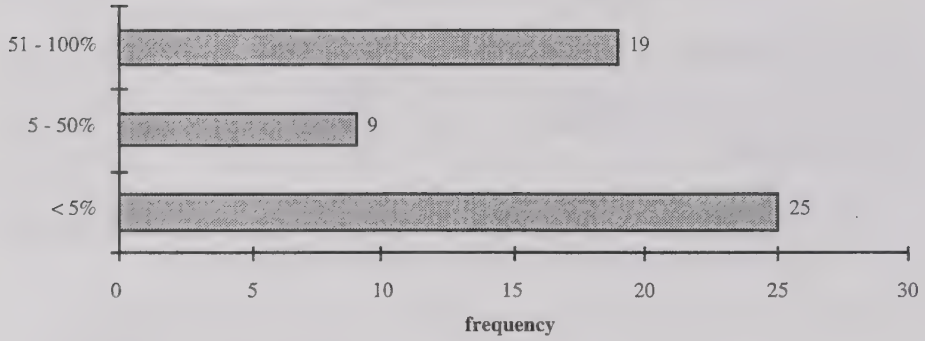
holoholo + kaukau + expense + profit:	22
holoholo + kaukau + expense:	15
holoholo + kaukau:	5
holoholo + profit:	2
holoholo + expense + profit:	3
holoholo + expense:	2
holoholo + kaukau + profit:	1
holoholo:	1
kaukau + expense + profit:	1
kaukau + profit:	1



Question: *What percentage of your gross yearly income comes from fishing?*

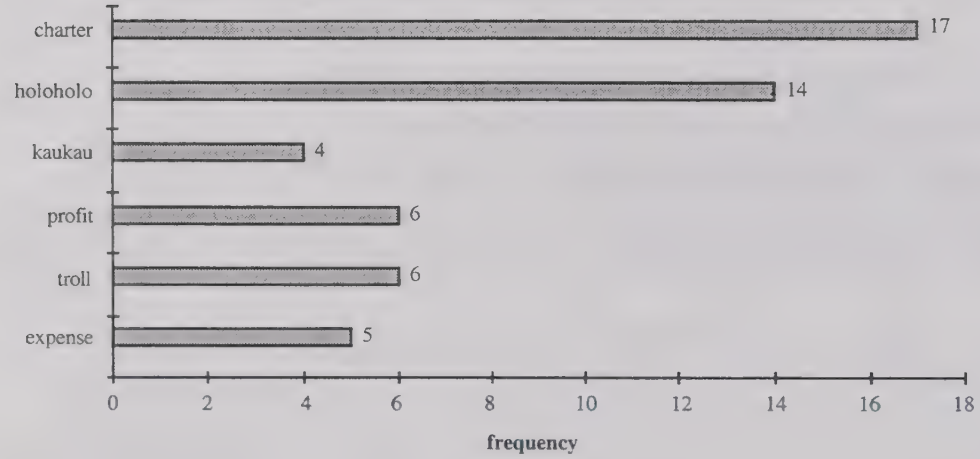
The mail in survey conducted by Harman and Katekaru (1988) revealed a far lower percentage of respondents who grossed more than 50% of income from fishing.

less than 5%	25	5-50%	9	51-100%	19



Question: *Which of the above kinds of fishing do you most often set out to do?*

charter	17
holoholo	14
kaukau	4
profit	6
troll	6
expense	5



5.1.3.3.C. Fishing Action

A basic distinction in everyday life separates work from recreation and leisure. While satisfactions and disappointments can be found in either kind of activity, the work situation differs qualitatively from the recreation situation. This difference is expressed in the "week day/weekend" contrast set.

i. "Time On" and "Time Off" Activities

Goffman (1967) compares "time on" or work activities with "time off" or non-work activities. In this, Goffman classifies each type of situation with two binary questions.

First, a situation is categorized as *problematic* if it has an element of uncertainty about it or is "not yet determined but [is] about to be" (1967:152-153). *Non-problematic* situations are those in which people have clear understandings about what they are doing and deal little with risk. This is the case for work that is organized by standard operating procedures, regular deadlines, and unambiguous job assignments and expectations. In short, the worker does not encounter surprises on the job.

Second, a situation is categorized as *consequential* if it has significance for the individual in the future. Goffman (1967: 159) defines "consequentiality" as:

> "..the capacity of a payoff to flow beyond the bounds of the occasion in which it is delivered and to influence objectively the later life of the bettor."

It follows that non-consequential situations would be those with little lasting impact on a person's future live opportunities.

With these distinctions, Goffman notes that "time-on" work situations are characteristically non-problematic, yet consequential. To illustrate, the day-to-day work of a bank teller or bureaucrat or factory employee is highly structured, hence non-problematic. At the same time, such work is consequential in that promotion or demotion are directly tied to performance and attainment of goals.

In contrast, "time-off" recreational situations tend to be problematic, yet inconsequential. The activities people engage in on weekends are often determined by chance as is illustrated by spontaneous acceptance of unanticipated invitations to socialize. These situations are ultimately inconsequential (at least as they are initially evaluated) in that they usually are not linked to career or personal development.

Although "time-off" and "time-on" activities have opposite loading on the problematic and consequential dimensions, they are, as Goffman (1967:164) notes, alike in that both are "uneventful: either nothing important happens or nothing important happens that is unexpected and unprepared for."

ii. "Action" Activities

Goffman (1967: 164) labels activities or situations that are simultaneously problematic and consequential as eventful or *fateful*. These include the occupational activities of, for example,

real estate speculators, prospectors, front-line soldiers, and commercial fishermen as well as the recreational non-spectator activities of mountain climbers, surfers, and others sportsmen. Generally fateful situations are defined by the presence of a strong element of chance—a gamble.

According to Goffman (1967: 172) fateful activities are those in which "a practical gamble is voluntarily taken. Many workers face risk on the job and cope as best they can, but this does not necessarily imply that the gamble is enjoyed."

When, however, risky situations per se are exciting and valued by participants they exemplify what Goffman (1967: 185) calls *action*:

> "By the term action I mean activities that are consequential, problematic and *undertaken for what is felt to be their own sake.* ...It is here that the individual releases himself to the passing moment, wagering his future estate on what transpires precariously in the seconds to come. At such moments a special affective state is likely to be aroused, emerging transformed into excitement. ...In asking the famous question 'Where's the action?' an individual may be more concerned with the intensity of the action he finds than its kind." (emphasis added)

Hawai`i troll and handline pelagic fishing is organized around the idea of action. A fisherman and sportsman confirmed the salience of risk in as a motivating factor in fishing:

> *"It's about action, isn't it? It's about action, passiveness, and also about feeding your family."*

Fishermen deal with an exposure to risk in fishing that is not found in non-problematic and inconsequential activities. One fishery manager echoed the thinking of many familiar with Hawai`i fishing in noting that *"fishermen are gamblers."* Another observer of the scene also saw the action in fishing: *"It's the hunt."*

Of course, some kinds of fishing emphasize chance-taking more than others. And individual fishermen may be inclined to not participate in situations where action is accentuated. In the words of one O`ahu troller:

> *"I don't enter many jackpot [money] tournaments. One would have to be a gambler at heart."*

Finally, it should be realized that even when fishing is at its best, action is rarely continuous. A woman who trolls with her husband on O`ahu is prepared for such lulls:

> *"When no action, I make leis."*

5.1.3.3.D. Phases of Fishing Action

Model 5.2 shows that the temporal phases of generic and tournament fishing action correspond to the four classic phases that Goffman (1967: 154) argues underlie all games of chance and action activities.

Generic fishing situations are taken to encompass profit (commercial), holoholo (recreational), kaukau (subsistence or food fishing) Hawai`i styles of fishing. In this fishing, constraints on when to fish are determined by local weather, environmental conditions, the biological availability of fish, market and personal demand, fishery regulations, and access to vessels, gear and—in the case of charterboat/party boat anglers—services of captains and their crew. In sum, fishermen more or less go fishing when they want to. The span of generic fishing extends from the time fishermen leave port until they return.

Tournament fishing situations include the local tournaments of fishing clubs limited to members, international prestige tournaments, "money" tournaments, and other variants on the tournament theme (Appendix 6). This fishing resembles generic fishing with the qualification that additional equipment, procedural, logistic, and ethical rules further structure fishing conduct. Thus, tournament fishing can be influenced by fishing line/reel/rod/leader/lure/bait rules developed by club authorities and international fishing associations and entities, by qualification rules, by rules that identify "tournament species," by rules specifying proper interactions between anglers (and between anglers and crew), by rules that have to do with the location of starting lines and starting times, by rules concerning responsibilities to treat fish that are to be tagged and released with special care, and so forth. The span of tournament fishing frequently is designed to incorporate several or more trips over, say, a weekend or week.

Model 5.2 Phases of Fishing Action*

	Phase I Squaring-Off	**Phase II Determination**	**Phase III Disclosure**	**Phase IV Settlement**
Generic Fishing (*e.g.* profit/commercial, holoholo/ recreational, kaukau/subsistence, and expense fishing)	Steaming from port to fishing grounds	Fishing	Returning to auction or port	Distribution of catch and/or profits among crew
Tournament Fishing (*e.g.* local club, money and international prestige tournaments)	Steaming from port to starting line and then to fishing grounds	Fishing	Returning to weighing/ judging dock or port	Posting of results

* These phases taken from Goffman (1967) correspond to the scientific phases of research design, data collection, analysis, and write-up.

Phase I: Squaring-Off
As discussed in an earlier section, a fishing trip can be conceptualized as beginning when a fisherman first gets the inspiration or idea to go fishing. Following this, the fisherman recruits others to fish with and makes fuel, gear and other preparations.

The *squaring-off* phase of generic pelagic fishing in Hawai`i begins when the vessel departs from port and steams to fishing grounds. It is during this period that strategies about where to fish and what equipment to use are made. The fisherman—like the poker player who has been dealt a hand of cards—begins to evaluate the opportunity before him.

The squaring-off phase for tournament fishermen is somewhat more elaborate in that the vessel must first go to a starting line and vie for a position before proceeding at the start of fishing signal.

Phase II: Determination
The *determination* phase of both generic and tournament fishing begins when the fishing line hits water. Fishing ends in generic fishing at the pleasure of the fisherman. In tournament fishing, a formal signal or agreed time ends fishing.

This phase of fishing is "where the action is" in that the situation is both problematic and consequential. The fisherman has voluntarily taken a risk and is willing to respond to the whims of nature—ideally in an interaction with target fish. Just as the blackjack or poker player makes choices and in the playing of a hand, so the fisherman offers and then changes baits and lures, and (re)positions the vessel and fishing line. Other adjustments and tactics are used in the attraction, "striking," fighting, boating (and sometimes releasing) individual fish.

Phase III: Disclosure
The *disclosure* phase begins after fishing has ceased. It is in this phase that fishermen—like the card player revealing his cards—communicates good and bad news to others. This can be accomplished from the fishing vessel by radio, cellular telephone, and with the display of flags. The full details of the catch are communicated in generic fishing when the boat offloads at a fish auction or returns (sometimes empty) to port. In tournament fishing, disclosure for fishermen who have had a successful trip is highly ritualized (and open to public view) at weighing and judging stations on the tournament dock.

Phase IV: Settlement
The final *settlement* phase of generic fishing entails the distribution of the catch (or shares of profit) among the crew. In tournament fishing, settlement occurs with the posting of results at the end of each fishing trip and with an award ceremony at the end of the tournament.

5.1.3.3.E Fishing Character
A main sociocultural theme of Hawai`i styles of fishing is that fishermen are able to develop relationships with family, friends, and co-workers through profit, holoholo, expense, and kaukau fishing. To review, fishermen's commitments to fishing can be analyzed by rational and also ritual models.

The previous section described how generic and tournament fishing fit an action model in which fishermen are seen to purposively pursue experiences marked by risk. Fishing, then, can provide what might be called "action windows"—periods which are valued for the interplay of risk and excitement.

One Big Island troller remarked on the attraction in fishing by referring to the marlin fisherman in Hemingway's *Old Man and the Sea*:

> *"He fished all his life and was still yearning to return, [hoping] that [his] luck would turn. It's a challenge going out knowing that his fish is out there and that one of these days I'll have my day in the sun."*

With this framework, the question arises as to what it is that the fisherman in an action window is, in fact, risking. This question would appear to be answered in a straightforward way. Profit fishermen risk not being able to generate an income through the sale of fish. Holoholo fishermen who fish for sport with light gear risk being unable to land a hooked fish. Kaukau fishermen risk being unable to put food on the table.

The sociological answer as to why fishermen look for action is that fishing allows them a focused opportunity to display and therefore risk their social identity and reputation. It is Goffman's (1967:214) thesis that action situations are "species of activity in which self-determination is celebrated." More fully, he argues that action situations are times for a demonstration of *character* :

> "Evidence of incapacity to behave effectively and correctly under the stress of fatefulness is a sign of *weak* character. He who manifests average, expected ability does not seem to be judged sharply in terms of character. Evidence of a marked capacity to maintain full self control when the chips are down—whether exerted in regard to moral temptation or task performance—is a sign of *strong* character." (1967:217)

This is exactly the point a troller from the island of Hawai`i wanted to make when he stressed that one of the fundamental reasons for fishing had to do with "recognition by your peers."

Among Goffman's (1967: 218-229) major forms of character that are to be found to be put to the test in the Hawai`i troll and handline fisheries are the following:

i. courage

Courage is "...the capacity to envisage immediate danger and yet proceed with the course of action that brings the danger on... whether the nature of the risk ...[is] physical, financial, social , or spiritual." (1967:218)

To illustrate, an Oahu owner of a charter fishing business commented on the courage and tenacity of a local handliner in this way:

> *"One local guy makes $120,000 a year fishing. [He] really works at it. I have a lot of respect for him. He's a loner...[and] goes all the way out to the seamounts."*

ii. gameness

Gameness is "...the capacity to stick to a line of activity and to continue to pour all effort into it regardless of set-backs, or fatigue, and this is not because of some brute insensitivity but because of inner will and determination." (1967: 219)

iii. integrity

Integrity consists of "...the propensity to resist temptation in situations where there would be much profit and some impunity in departing momentarily from moral standards. Integrity seems especially important during fateful activity that is not witnessed by others." (1967:219)

An example of this is found in the account of a Hilo troller who recounted how he had made the mistake of handlining a fish in a club tournament after his reel had broken. After he reported the error to officials he discovered to his surprise that his image had greatly improved in the eyes of his peers:

> *"[In] one of my first tournaments I disqualified. And that made my reputation in the club."*

iv. gallantry

Gallantry is "...the capacity to maintain the forms of courtesy when the forms are full of substance. It is shown when Douglas Fairbanks, in the middle of a cinematic duel to the death, retrieves his opponents fallen sword and hands it to him with a polite bow, the better to prevent a meaningless advantage from cutting short the opportunity for valid expression. " (1967:220)

v. composure

Composure is "...self-control, self-possession, or poise... Composure has a behavioral side, a capacity to execute physical tasks (typically involving muscle control) in a concerted, smooth, self-controlled fashion under fateful circumstances.... Composure also has ...an affective side, the emotional self-control required in dealing with others. ...Along with smooth movements and unruffled emotions, we can consider that of mental calmness and alertness, that is *presence of mind*." Composure has still another side, the capacity to contemplate abrupt change in fate—one's own and, by extension, others'—without loss of emotional control, without becoming 'shook up.'"(1967: 223-225)

vi. dignity

As an aspect of composure, *dignity* denotes "... the capacity to sustain one's bodily decorum in the face of costs, difficulties, and imperative urges. ...The maintenance of physical poise [Goffman gives surfing and skiing examples.] is not merely a condition of effective performance but a central purpose it of. (1967: 225-226).

A variation on the character trait of dignity arises from feelings of self-worth, particularly when one has succeeded in the face of adversity. One fisherman, when asked why he fished, answered this way:

> *"Pride. A lot of pride."*

vii. stage confidence

Stage confidence is an aspect of composure that is centered around "...the capacity to withstand the dangers and opportunities of appearing before large audiences without becoming abashed, embarrassed, self-conscious, or panicky. Behind this is the special type of poise that pertains to dealing with the contingency of being under the observation of others while in an easily discredited role." (1967:226)

Stage confidence is particularly important in tournament situations. When fishing captains use their radio to report to tournament authorities, they are careful to underestimate the weight. In reference to this calculation, one captain remarked on time he had spent second-guessing a report:

> *"All day long I was debating with myself if it was a legitimate 300 pounds."*

Another fisherman noted:

> *"I've never seen a tournament where someone called in a 400 lb. fish and it was an overestimate."*

Making the same point, a well-known Hawai`i fishing expert and author commented:

> *"Usually they underestimate on the radio. They don't want to be under."*

5.1.3.3.F. Character Tests: Good Fishing, Great Fishing, and Blowing It

Hawai`i troll and handline fishing, like fishing elsewhere, is inherently risky. As an occupation or recreational activity, Hawai`i fishing is simply not attractive to people who would make a point of avoiding risk. These people are not found among the ranks of fishermen.

Two kinds of personal commitment are to be found in Hawai`i pelagic fishing. First, there are fishermen who cope with risk, but do not consider it as an amenity. Some of these fishermen are involved in fishing for reasons (*e.g.*, to make money) expressed well in rational models, and others are involved for reasons (*e.g.*, to be part of a family or work group) explained with a ritual model. Fishermen of both types—who can be called "fateful fishermen"—tolerate the chance and risk factors in fishing, but do not celebrate fishing for its action.

Hawai`i fishermen who exhibit a second kind of personal commitment are those who are drawn to fishing precisely because for the chance to gamble character. For these "action fishermen" risk is an amenity. As Goffman (1967: 239) points out:

> "Excitement and character display, the by-products of practical gambles, of serious fateful scenes, become in the case of action the tacit purpose of the whole show."

Action fishermen put their character on the line each time they go fishing. One of these fishermen summed up his involvement in pelagic trolling in the following way:

> *"You know, there are two kinds of fishing. There is good fishing and great fishing. Great fishing is when you catch something."*

A few remarks on these two kinds of fishing, as well as a third, follow:

i. "good fishing"
As the troller's statement makes clear, "good fishing" to an action fisherman does not have to suggest that fish were caught. Of course, what is implied is that a fisherman's character was well-managed throughout the trip. In this kind of good fishing, fishermen strengthen their relationships with other fishermen as described in the ritual model discussed above. Importantly, fishermen can pass the tests of fishing technique, etiquette, and knowledge even if they have no fish to show for it on this occasion.

ii. "great fishing"
It stands to reason that fishing can be called "great" if the catch is impressive. Yet, fishing can also have great significance to a fisherman if he or she has an exceptional day at displaying character. Fishermen who demonstrate integrity, poise, and composure while fishing find their reputations dramatically enhanced.

iii. "blowing it"
The term "blowing it" has both technical and sociological meanings in Hawai`i pelagic fishing. Blowing it is the third possible outcome of fishing in addition to good fishing and great fishing. In a technical sense, blowing it refers to mistakes a fisherman can make in fighting and landing a fish. Sometimes a fisherman will claim to have blown it when the mistake is invisible to others. This kind of blowing it can, in fact, sometimes add to the fisherman's reputation. This occurs when observers are impressed by the complexities and subtleties they presume to be part of the performance put out by the fisherman who has erred.

Technical mistakes do, of course, result in lost fish and weaken the fisherman's reputation. Mistakes of character while not always involving a fish on a line can cause a fisherman's reputation to crash. Anglers who unequivocally cheat in tournaments (and who are noticed) suffer this fate, as do those who manage to show they are short on courage, gameness, or sportsmanship, among other character traits valued in fishing action.

5.2 Fishery Management Issues: Fishermen's Perspectives

5.2.1 Fishery Management Opportunities and Problems

Fishery management issues have their foundations in the differing ways people in the harvesting, distribution, management, and public elements of fishery systems evaluate the performance of fishery management. Research questions concern what fishermen and others perceive as fishery management issues, where they see solutions to lie, and how they would respond to alternative institutional and regulatory actions. The study of perspectives can involve rapid assessments of attitudes (also studied as preferences and votes) regarding policies, as well as more intensive examination of underlying values such as those that point to the "correct" role of government in society and the "proper" specification of environmental ethics.

Fishery management issues can be partitioned into sets of fishery management opportunities and fishery management problems that are treated in the regional fishery council system. The former receive the attention of the management community when topics of fishery development, technology transfer, and fishery education are on the agenda. The latter, of course, are debated with intensity as part of the fishery management policy process.

Drawing from the sociological literature, *fishery management problems* are what people say they are. (For a discussion of the nature of fishery management problems, see WPRFMC [1995].)

All fishery problems—even if they are supported by biological, environmental, or physical data— are social problems because they depend on a human judgment that some condition is unacceptable. Fuller and Myers (1941: 320-321) provide a useful introduction to the dimensions of these problems:

> "A social problem is a condition which is defined by a considerable number of persons as a deviation form some social norm which they cherish. Every social problem thus consists of an objective condition and a subjective definition. The objective condition is a verifiable situation which can be checked as to existence and magnitude (proportions) by impartial and trained observers... The subjective definition is the awareness of certain individuals that the condition is a threat to certain cherished values... *In the last analysis, social problems arise and are sustained because people do not share the same common values and objectives*." (emphasis added)

In the study of fishery management problems, social science can be utilized not only to examine the objective condition aspect of the problem, but also the value-judgments of the people involved that leads them to define the same condition and means to its adjustment in different ways.

Fishery management problems illustrate the conceptual insight of Fuller and Myers' (1941: 321) social problems work in that they:

> "exhibit a temporal course of development in which different phases or stages may be distinguished. Each stage anticipates its successor in time and each succeeding stage contains new elements which mark it off from its predecessor. A social problem thus conceived as always being in a dynamic state of 'becoming' passes through the natural history stages of awareness, policy determination, and reform."

Drawing from elaborations on this framework by Spector and Kitsuse (1987), the natural history of fishery management problems is depicted in Model 5.3. Inspection of the model shows that. fishery management problems are identified and treated, and that they are sometimes are re-identified and re-treated in a second iteration.

In the first phase (*emergence of problem*), constituencies (*e.g.,* elements of the fishing industry, scientists, managers, the public) initiate a claims-making process in which an unacceptable fishery condition (concerning, for example, biological overfishing, economic overfishing, cultural displacement, threatened species) is defined and communicated to others. As part of this process, constituencies begin to press for formal attention to the problem by fishery management authorities.

In the second phase (*legitimization of problem*), fishery laws and policies are designed, implemented and enforced. This transpires as fishery managers engage with others in the legislative and executive processes of government.

Fishery management policies can always be improved or made less costly. But policies are also evaluated by the constituencies affected according to how the regulatory regime changes the balance of social controls and personal freedoms. As a result, fishery policies supported in one moment can be opposed in the next.

In the third phase (*institutional challenge*), constituencies express their dissatisfaction with fishery management tools, philosophies and policies. In the claims-making process, it can be asserted that the original problems persist, or it can be asserted that the solutions are ineffective, therefore qualifying in their own right as problems. As in the first phase, the (re)packaged problem is marketed and remedial action by authorities is encouraged.

In the fourth phase (*institutional reform*), the legislative and executive processes of government are used to re-create the institutional environment in which fishery management takes place. It is in this phase that new authorities are designed and new laws enacted.

In passing, we make two points about how individual fishery management problems might be expected to conform to the natural history model. First, problems compete not only with other entirely different problems, but with close relatives that are variations on a single theme. Second, problems can lose momentum and supporters in any of the phases and disappear from view. Of course, some problems come back into focus after a period of neglect.

Phase 1	*Phase 2*	*Phase 3*	*Phase 4*
EMERGENCE OF PROBLEM	LEGITIMIZATION OF PROBLEM	INSTITUTIONAL CHALLENGE	INSTITUTIONAL REFORM
Claims-making Process	*Legislative/Executive Process*	*Claims-making Process*	*Legislative/Executive Process*
• identification of unacceptable *condition*	• policy design	• identification of unacceptable *solution*	• institutional design
• strategic marketing of problem	• policy implementation	• strategic marketing of challenge	• policy design
• demand for formal attention of authority	• policy enforcement	• demand for institutional attention	• policy implementation
			• policy enforcement

Model 5.3 Natural History of Fishery Management Problems

5.2.2 Findings: Fishermen's Perspectives on Management Issues

In this section, we report findings from interviews with troll and handline fishermen concerning pressing fishery management issues (survey instrument attached as Appendix 3). For each of the interview questions, responses were grouped into problem categories. For questions that elicit binary responses, the category is obvious from the question. Inspection of these groups shows the diversity of answers for each question. The categories of problem were then considered in the context of recent Western Pacific Regional Fishery Management Council actions (see Table 4.4). This permitted a preliminary determination of whether the problem presently has a phase one (*emerging problem*) or phase three (*institutional challenge*) status.

Question: *Was fishing better or worse for you over the last 12 months?*

Note: The Harman and Katekaru (1988) study asked a similar question: "In your opinion, is commercial fishing generally good now." Most respondents indicated that they were unhappy with the present state of commercial fishing in Hawaii. Although those respondents were prompted to choose certain reasons, the respondents in this survey listed similar reasons for the "worse" fishing situation: fewer fish due to overfishing; pollution; and natural cycles.

Worse	**26**
Better	**9**
Same	**9**

Worse

- "Worse, just an off year."
- "Worse, less fish."
- "Worse, because of overfishing due to longliners... due to raid of longliners over the last 5 years."
- "Way worse."
- "Much worse."
- "Worse, especially for the last 4 months... not much since the yellowfin have disappeared."
- "Hard question... large aku fishing was much worse in '94... marlin fishing was worse... a lot worse.
- "Worse. Less fish. The striped marlin didn't show up. Weather."
- "Worse. Less target species—in the past year, we have caught less target fish (marlin, ahi and more small fish (mahi))... The fish count is the same, just smaller species."
- "Worse, the fish are just not around. They're being fished out."
- "Worse than last year, less fish—marlin, good tuna though, more and bigger."
- "Worse, because less fish."
- "Slightly worse."
- "Decreased because I was bottomfishing at this time last year. Since I have started charter fishing, it has definitely decreased—partially because of lack of business."

Better

- "Better, a lot of fish."
- "It was okay. There are always good years/bad years for fishing."
- "Better, because I have tuned myself to fishing where the fish are."
- "The fishing has been good for ahi."
- "Tuna was better in '94 than '93."
- Mahimahi was better."
  "Ahi was good... mahi was good

Question: *When you think of the condition of the pelagic species and other sealife, what problems worry you the most?*

Note: Most of the respondents answered the questions in this section with phrases or sentences. A content analysis reveals that the answers reflected categories of concern, and the answers are grouped accordingly. All answers are direct quotations, unless grouped with a number in parentheses after the response. These responses were not all exactly said the same way, but seemed to have the same essence.

Overfishing

- "overfishing" (11)
- "overfishing by longliners"(6)
- "overfishing the rats at the buoys—they don't taste that good. The more boats of all kinds, the more pressure there is on the resource."
- worried a little bit about (seamounts/boats) catching rats (small *`ahi*)
  Problem Status: Phase III—Institutional Challenge

Resource Depletion

- "lack of baitfish (opelu, akule, aku)"(2)
- "You see a lot of the ika-shibi guys catching a lot of smaller fish."
- "lack of fish"(14)
- "don't see a lot of sealife"
- "preservation of resource"
- "size of fish getting smaller every year" (2)
- "lack of the ika-shibi run outside of Hilo"
- "Because the aku is not here... the marlin here, the aku fishery is a real bad situation."
- "scarcity."
  Problem Status: Phase III—Institutional Challenge

Market Prices for Fish

- "We have no control of our fish market prices here. I think that fishing has become technology based—it is easier than it used to be to catch fish."
- "fish price"
  Problem Status: Phase III—Institutional Challenge

Pollution and Waste

- "pollution" (7)
- "on-use of bycatch by commercial fishermen... .I think that is kapu—everything you catch can be used for something."
- "ignorance on the part of the local fishermen to just kill everything they catch"
- "the rape of the environment—when they are done they go to some other place"
- "killing of blue marlin for prestige"
- "worry about wastage"
- "too much plastics floating in the ocean"
- "ocean dumping"
- "pollution affecting the resource"
- "golf course development, fertilizers"

Problem Status: Phase III—Institutional Challenge

Fishing Techniques or Groups

- "longliners"(5)
- "longliners, foreign, mostly Japanese and non-caring attitude by the state officials"
- "driftnets"(2)
- "gillnetting"
- "foreign country dominance"
- "purse-seiners"

Problem Status: Phase III—Institutional Challenge

Management

Note: Language of the fisherman that has been glossed is surrounded by single quotation marks.

- "worry about (potential) manganese mining... would destroy sport fishing"
- "State is 'backwards,'... make licenses like dogtags."
- "I hear all the time about tag and release but never hear the results of recatch. What is the incentive of tag and release anyway?"
- "mismanagement, lack of education, lack of size/catch limits. The fishery in Hawaii is run by guys who want money short term without looking toward the future."
- "The off-stations (FADs) are not replaced and result in loss of fish for sale/charter. FADs produce flags (fish)."

Problem Status: Phase III—Institutional Challenge

Other

- "ciguatera"

Question: *When you think of the condition of the fishing industry and what the fishing means to people and communities, what problems worry you the most?*

Costs and Income Problems

- "equals no money, for example, Japanese economy, worsening fishing conditions due to overfishing and rising costs of operating vessels"
- "Fish market prices are not controlled by the fishermen, there is no union. This may be a problem for families."
- "Locals like to keep the fish—that is lost income to me."
- "Having to spend more time to catch fish, we have extended our full days from 8 to 10 hour days, having to work harder for the same results."
- "The cost of fishing makes it impossible for many folks to fish."
- "Loss of income as the fish deplete—the problem is that they are catching them and sending it overseas."
- "Too many charter boats can effect (adversely) prices of fish, too many fish drive price lower and cut into profit/expense."
- "dying way of life, because not financially feasible"
- "Subsistence fishermen will be forced to find other avenues to sustain their lifestyles."
- "loss of jobs, we would have to find other work, fishing is a rejoicing time"

Problem Status: Phase III—Institutional Challenge

Competition

- "It directly relates to our industry, it is a very important factor, especially small commercial industry, simply because the word gets out that the longliners have got all the fish, fishermen don't want to come here."
- "Weekend warriors fish to pay for their equipment and fuel. If you have a full time job and fish to have fun, it is ridiculous for them to kill 30 pound marlin."
- "The biggest problem is everyone wants to sell their fish for money—especially marlin, nobody will tag and release."
- "ciguatera, longline boats"
- "It is hard for the local guys to support themselves, but our market depends on the small troller for commercial fish."
- "The charter industry will falter and die."
- "Competition with the locals, it is unfair to them because all the commercial guys are catching the fish without compensation."
- "legislating little guys out of the water, overpopulation of people straining the resource, big boys (longliners) flood market and kill price of fish for little guys"
- "Longliners and gillnetters should have stricter regulations."
- "Sometimes see longliners offshore and they probably are causing a heavy impact."
- "competition between longliners, offshore handliners, nearshore (small boat guys)"
- "the fact that the majority of commercial fishing vessels are owned by foreigners or people not from here"

- "longline boats, fish collecting"
- "overfishing by commercial operations... lack of fish for people of the communities."

Problem Status: Phase III—Institutional Challenge

Overfishing/Management of Resource

- "People overfish."
- "increased crime brought upon by increased drug usage by commercial fishermen"
- "too many fishermen, everybody's techniques are getting more advanced, less schools of fish are being seen"
- "overfishing an area which alters livelihood, causing community to seek other means of support which may further damage resources, loss of balance"
- "lack of fishery and low prices"
- "lack of fish (to eat)"
- "overfishing"
- "not enough fish"
- "fish in Hawaii is a lot to do with culture, like New Years"
- "overharvesting by longliners"
- "future supplies"
- "future fishing, they (fish) might not be there."
- "worried a little bit about making fisheries limited, regulations protect the 'weekend fishermen,' the local style"
- "potential damage to exchange of fish within the community—sharing"
- "'poor' planning"
- "overfishing by commercial longliners"
- "I like the no license idea... fishing is a birthright."
- "The depletion of the resource affects everybody."

Problem Status: Phase III—Institutional Challenge

Question: *What changes in management regulations would you like to see implemented in the pelagic fisheries?*

Note: Respondents were able to list multiple changes.

Additional management for longline fleet (25)

- "limit set on longline fishery, number of permits issued to longline boats decreased, catch quotas for longline industry"
- "observers on the longline boats"
- "gear restrictions on commercial fishermen"
- "Get rid of Vietnamese, and have only local (HI residents) own their own longline boats."
- "To see permits required for large scale commercial fishing vessels and maximum tonnage taken per vessel limits set. Too few people taking too large numbers of fish."
- "observers on every longline boat, restrictions on numbers of longline boats"
- "I would like to see limit on the number of longliners kept to a minimum, more internal waters surveillance."

- "longlining cut out or down to a manageable amount"
- "more regimented head count, (number caught), size restrictions, and seasonal fishing for commercial"
- "more active role by WESPAC in regulation of commercial longline fishing."
- "cut down the number of longlines fishing here, maybe size restrictions on fishes"
- "no entry of foreign longliners into US ports for any reason, Gulf coast longlines, non-caring policy—states just wants income, are not worried about overfishing"
- "limited entry for big time longline, income based (too much money, no fish) commercial"
- "longliners banned within 200 miles"
- "limiting longliners and keep out driftnetting"
- "extend boundaries for longliners... keep them out of our area"
- "total ban on driftnets and longliners"
- "extend and control longline areas"
- "Longliners and gillnetters should have stricter regulations."
- "Limited entry program for longliners maintained."
- "obviously and selfishly, limit fleet with permits(state inshore ahi fleet)(longliners)"
- "cut out purse-seining and longlining, ocean dumping and what not."
- "Now that the bigeye are depleted, they are targeting yellowfin which are in the billfish range. It is not recorded on any catch report—some never know what was caught. For pelagic fish to survive you really have to regulate purse-seiners and longliners... too much by-catch. You really have to regulate it."
- "legislation to limit commercial fishing and number of commercial vessels, limit on numbers caught, more accurate tally of by-catch... observers on board"
- "Keep longliners out."

Problem Status: Phase III—Institutional Challenge

Enforcement Issues (5)

- "more enforcement"(2)
- "stricter penalties for fishermen who break the laws and restrictions, more enforcement"
- "More fishermen need to get involved in reporting violations."
- "regulate and enforce foreign vessel infractions"

Problem Status: Phase III—Institutional Challenge

Size Limits/Quotas (10)

- "size restrictions on all pelagics"
- "cut down fishing off small fish, tag and release... or whatever"
- "tag and release law for marlin with size limit"
- "Limit size of ahis... no rats. Fine boats who take small fish."
- "Limit tonnage of small tunas."
- "minimum size (aku, flagfish)"
- "stricter minimum size regulations"
- "a way to regulate the number of small tunas and marlins taken by the weekend warrior guys"

- "Quotas in endangered areas due to fishout."
- "seasonal catch limits"

Problem Status: Phase III—Institutional Challenge

Other (18)

- "no marlin on the menu, recreational fishing licenses to cover costs of regulation"
- "I would like to see that there actually is management, it seems that here in Hawaii that is a free for all. It only seems there are regulations for longliners, size minimum, catch limits for commercial boats."
- "no tag and release marlin caught with live bait, no stainless steel hooks for billfish"
- "use database to budget zones for commercial, recreational, limits not static, like salmon counts in Northwest"
- "make season on all fishing"
- "more rules"
- "reporting requirement for recreational fishermen... simplification and improvement of reporting for commercial fishermen"
- "Make quantitative information (stock, migratory patterns) available/accessible to fishermen."
- "No changes... don't like permit fishing."
- "number of boats and areas"
- "more buoys (FADs)"
- "more monitoring, multi-lingual information system, recognize aboriginal rights, facilities should be available when openings happen... .An '800' number for fishing information... leave management"
- "Promote tag and release among sportsfishermen."
- "ban on the sale of marlin -import and export"
- "don't want over-regulation where it is hard for the small guy to make a living... .tag and release implemented unilaterally, it has to be on an international level"
- "I don't know much about regulation."
- "More quantification by agencies based on more input by fishermen."
- "catch no more than you need... deregulate (Kaukau style) fishing"

Question: *What country (or state or region) has the best management system for the pelagic fisheries?*

Alaska

- "Alaska"(7)
- "Alaska, because there are so many fish they don't have to regulate it as much."
- "Bristol Bay, Alaska—they manage by keeping track of species numbers."
- "Alaska, because there are number limits and size restrictions, the fines are very strict and even the commercial fishermen have a quota."

United States

- "U.S. because I am not sure about other places. I know a bunch of other places that need slaps on the wrist... Maybe Mexico for the 1 marlin/day."
- "U.S."

- "U.S.—sure as hell not the Japanese"
- "In Hawai`i, the management of bottomfishing and lobster is good... by setting minimum quotas to improve conditions... So maybe something like that for pelagics."
- "Hilo"
- "East Coast, Georgia's Banks, near North Carolina—they have cracked down"

Other
- "Guatemala, because no longliners... no marlin are accepted unless it is positively a world record."
- "Scandinavia (Norway/Sweden)"
- "Republic of Maldives—Indian Ocean... no foreign vessels, no exceptions."
- "New Zealand"
- "New Zealand, because they do not allow foreign commercial boats into their ports."
- "I know New Zealand has a pretty good system... native rights."
- "Japan"
- "Australia"
- "Queensland, Australia, because they have an airborne marine police."

Question: *If pelagic fishing remains the same for you over the next year as it was over the last 12 months, will you continue fishing (yes or no)? What changes will you make?*

yes	45
no	3

Changes
- "more tag and release"
- "I will be trying to captain a boat instead of being crew... more up the pay scale."
- "personally, we are working on a tag and release but we still need to make the business viable... .We will tag and release more fish next year, guaranteed."
- "I might have to get a real job."
- "Look for a better paying job in my fishing field."
- "We'd like to upgrade our equipment."
- "change style of fishing gear, phase down on tackle size, more deepwater fishing using downriggers"
- "tag and release unhurt small marlin"
- "wait 'til the bite is on"
- "learn more local tactics—palu-ahi, ika-shibi"
- "better fish management"
- "begin to experiment with ika-shibi fishing"
- "but it can't keep going—it gets too hectic and you need to find other work"
- "tag and release billfish"
- "get into more tag and release fishing"
- "run my own boat—I am not used to working other people's boats"
- "with limitations, it will not be full-time, more so for fun"
- "sell boat"

- "no changes. We are not out there to make money."
- "no more change, it is part of my lifestyle"
- "go to different spots (South Point)"
- "I'd do more bottomfishing because the pelagics are less happening."

Question: *Do you consider it acceptable for blue marlin to be sold (yes or no)? If so, under what conditions?*

Yes (49)

- Yes (15)
- "Yes, but within good management... no undersized fish sold, and catch quotas studied."
- "Yes, if I catch them I will sell them... just because there isn't any incentive to tag and release."
- "Yes, for food." (2)
- "Yes, because I don't feel that they are endangered enough not to be caught."
- "Yes, because it pays bills. Set a size limit."
- "If it comes to the boat dead, it should be sold; otherwise it should be released."
- "Yes, by rod and reel for catch."
- "Yes, it is good sashimi, good fishcake, and I just got $2.50 per pound yesterday for a striped marlin."
- "Yes, if they don't let the longliners sell them, they will throw them back dead."
- "Yes, because it is a good source of food for the Hawaiian public. In actuality there is no way to stop the sale, if you stop trolling sale, you would have to stop longline sales."
- "Yes, mortally injured and large."
- "Yes, if the fish is caught it should be sold. It should not be a sought after species just because it can be sold. Sale should be allowed so there is no waste."
- "Yes, that is how I make a living."
- "Yes, minimum weight required."
- "Yes, if they can't be released healthy."
- "Yes, it is food and fish should be caught to eat."
- "Yes, if fish is unfit for tag and release."
- "Yes, but with size limit, nothing under 150 pounds unless damaged in fighting."
- "Yes, if 350 pounds and above."
- "Yes, every fish can be sold."
- "Yes, minimum weight, 100 pounds."
- "Yes, if it is commercial fishing versus sportfishing, which should be a sporting event and not sold."
- "Yes, but with strict quotas for longlining and gillnetting."
- "Yes, some limits on amount sold and size limits, as long as there are no indicators of overfishing."
- "Yes, as long as they are of appropriate weight."
- "Yes, here in Hawaii because it has always been prime food fish, it is part of the culture here."

- "Yes, I think there is a bunch of blues out there... .we'd catch a bunch of stripers on many... "
- "Yes, under the captain's discretion For sportfishing and commercial, if the fish is wounded or killed, it should be sold for food and eaten. People sometimes get greedy and waste it.
- "people have different ideas, no can abuse"
- "You eat what you catch."
- "Okay, as long as it is not wasted. Tag and release is the best thing to happen to Kona."
- "Food source"
- "better sold than wasted"

No (6)
- No (3)
- "Personally, no, but if we did not sell it I would not be able to make a living... their sportfish value is a million times their market value."
- "No, because the species won't survive."
- "No, I think they are very noble fish... there are other fish to eat. Tag and release is better so we know what is going on. People just want to make a buck."

Question: *Looking to new research possibilities, what would you personally like to know about fish and the marine environment?*

Migration Patterns
- "I would like to see marlins and ahi tagged to see their migration routes."
- "migration patterns" (2)
- "know more about marlin habits: do they mate here or follow the Kuroshio current? Marlin fascinate me."
- "migratory routes. That is why we should tag and release."
- "We need more information on migration patterns of pelagic fish, and feeding patterns, especially tunas."
- "more about migratory patterns, about what types of food, feeding habits"
- "migratory patterns of fish, and is fish tagging effective in accomplishing its task?"
- "migratory patterns, habits, behaviors"
- "migratory patterns on tuna and marlin"
- "What fish migrate where? What causes them not to come?"
- "Less ahi seem to be migrating. Why? Longliners?"
- "Where are the fish? migratory patterns.

Fish Behavior Patterns
- "nothing I really couldn't find out... growth rate of marlin (any fish), reproductive cycles."
- "learning more needs of fish, know breeding seasons, when we shouldn't catch them, education"

- "tell me what and when they eat, and at what depths and temperatures, their breeding cycles, and how many numbers it takes to sustain a fish species, how much of it should be used as food substance"
- "breeding habits and spawning, so I know when to release a fish; feeding patterns, so I learn to catch more fish and make the lures attract more fish"
- "what lures they bite, and feeding habits"
- "what day they are biting, lunar cycle"
- "feeding and spawning habitat"
- "fish supply"
- "Learn to think like a fish."
- "temperature and depth that the fish live at, actual studies that we could read"
- "how fast they age for procreation... use information to increase fish stocks"

Environmental Factors

- "all kinds of things: currents, El Nino, temperature, how they effect fish"
- "weather and water circulation, fish populations"
- "would like to know more about temperature and El Nino, fish populations and their catchability"

Other

- "population depletion of pelagics doing with monitoring worldwide exploitation of resources"
- "study fishery management of other countries to promote worldwide conservation and cooperation"
- "I don't really know what kind of destruction is going on."
- "Science has taken the challenge out of fishing."
- "That is what is killing the fishing industry...they (purse-seiners) know right where to go."
- "Maybe hatcheries can find better ways."
- "hatcheries for pelagics"
- "some endangered from overfishing"
- "preserve and increase fish stock"
- "What other countries are doing to control or protect future supplies."
- "distant water fleets—Japan and Korea"
- "numbers, stocks left, depletion, the schools are not finding their way here"
- "navigation equipment and technology"
- "nothing you can teach me, they have a mind of their own"
- "everything"
- "input from fishermen, monitoring, impact, make information available"
- "numbers, health of resource internationally"
- "volume left of species"
- "nutritional/safety/quality of food"

Question: *Looking to new research possibilities, what do you think it is important for people to know about the cultural and social value of fishing?*

- "We are overworked, underpaid, and overexploited. We are the last of the cowboys."
- "Hawaiians' value goes back, it is an inbred part here. Hundreds of people rely on the ocean to feed their families. People will fight change. Fish is a traditional dish on holidays and occasions. State government needs to realize that each billfish is worth a million bucks."
- "In Kona the charter industry is more important than the fish. It is more the business. In the long run, it would be better for tourism to eliminate the kill, so use tag and release of marlin."
- "Just know me as a fisherman."
- "That we sell our fish for so cheap, and that they sell it for so high. The mark up on fish..."
- "How many fish it takes to support a renewable fishing resource. They need hands on experience with fishing industry. They need to have a representative that actually sees what goes on. (they = policy makers)."
- "If they understand the cultural and the value of fishing, they might respect the resource more."
- "importance of fishing to the family unit, doing things together, the camaraderie of fishing, ...personally, know nothin' about me as a fisherman"
- "That the charter boats are not doing that good down here, ...all the guys need another source of income to survive."
- "To me, it is the best job in the world, I may never get rich, but..."
- "need to realize how much fishing has an impact on our economy, and how much it helps and promotes the economy"
- "that it should be equally sport and commercially viable"
- "Fish for what you need."
- "Fishing for me is not just a career, it is a lifestyle. It is up to the policymakers to set guidelines that enable me to catch fish and live a comfortable lifestyle."
- "The worst day fishing is better than the worst day working."
- "We have seen a decrease in fish catch, mainly marlin, over the last two years, it has been real bad. We are not seeing the schools of aku that we seen in past years."
- "That is an important industry, it needs to be guarded. We need concern about the welfare of the fishermen."
- "respect for ocean and resource"
- "Tourists should know the fish are not there to look at—they are there to eat."
- "Fishing is very important to this culture because people here have always fished. Talking story about fishing brings people together."
- "the importance of recreational and food fishing"
- "the bonding of the fishing community and the structure of the local fishing population"
- "In your system, it is honest living... a hard thing to give up."
- "It brings the family closer together, except maybe the wife."
- "Don't overfish and release what you don't want."
- "People need to practice conservation."

- "the future outlook"
- "not wasting valuable resources"
- "People shouldn't take the resource for granted, fish for what you need."
- "It is important to understand the value of the participants in the fishery and their ability to fish and catch fish—imparting their quality of life, lifestyle of fishermen and their values, why they fish."
- "It's a way of life, enjoyment of sea, food for body and soul, serenity."
- "Take what you need, don't overdo it."
- "Get off their butts and see how it is done. You cannot pass rules by sitting at their desks. They need first hand experience and see what is going on."
- "Everyone in Hawaii is a fish eater or fish catcher or both, it's a fish oriented society. You recognize who is a fisherman and who is not, right away."
- "Fishing is one of the oldest occupations... it should remain a viable occupation, but in order to maintain this we need to control overfishing and understand that the problem is not the little guy... it's the commercial guys."
- "food"
- "plenty of guys' livelihood, it's part of our culture, for example, New Year's fish... an oriental thing"
- "educational ways to protect the habitat"
- "People should realize fishing is a huge part of the culture... not only a part of income."
- "uses of fish parts"
- "Historically there was a balance between culture and resource... it was moral responsibility of fishermen to manage the resource."
- "It's an exchange of ideas, but nobody's giving away any secrets."

5.3. Cognitive Patterns

5.3.1 A Cognitive Definition of Culture

Culture has been defined in cognitive terms as what it is necessary to know (*e.g.,* including technical and procedural kinds of knowledge, norms, and traditions) in order to be considered a member of society. Expanding on this orientation, Goodenough (1957: 167) notes that:

> "Culture, being what people have to learn as distinct from their biological heritage, must consist of the end product of learning: knowledge, in a most general, if relative, sense of the term. by this definition, we should note that culture is not a material phenomenon; it does not consist of things, people, behavior, or emotions. *It is rather an organization of these things. It is the forms of things that people have in mind, their models for perceiving, relating, and otherwise interpreting them.*" (italics added)

In learning a culture (or in learning to speak a new language), one gradually develops competency at separating "meaningful" cultural units from their background.

In linguistics, the equivalent process is one of distinguishing phonemes from allophones--of noting the differences that make differences.

Reporting about a culture is a similar kind of challenge. Frake (1969: 471) has succinctly framed a primary ethnographic goal:

> "To describe a culture, then, is not to recount the events of a society, but to specify what one must know to make those events maximally probable. The problem is not to state what someone did but to specify the conditions under which it is culturally appropriate to anticipate that he, or persons occupying his role, will render an equivalent performance."

Fishery cognitions denote the understandings fishermen have about fish and their environment, and about the human organization of fisheries (refer to Figure 3.1). For a discussion of local fishery knowledge, see Appendix 2.

5.3.2 Findings: Fishermen's Cognitions of Pelagic Species

This section reveals the differing cognitions of three groups of fishermen with respect to the blue marlin, black marlin, striped marlin, spearfish, sailfish, ono, `ahi, skipjack tuna, shark, and mahimahi. The fishermen were given ten cards, each with one of the species names on it, and asked the following question:

Question: *This task is designed to explore the different ways in which people think about billfish and pelagic species. Take a few moments and look at these ten cards with fish names on them. Then sort the cards into piles (as many as 9 or as few as 2), putting fish that are similar to one another in the same pile. After you have finished, indicate for each pile the reasons you had for creating the pile.*

We analyzed the pilesort data using ANTHROPAC software and created the multi-dimensional scalings in Figures 5.1, 5.2, and 5.3. These figures represent the cognitions of three separate groups of respondents. We looked at "profit fishermen," who responded that they derive over 50% of their annual income from fishing, "non-profit fishermen," who derive less than 5% of their annual income from fishing, and "anglers," who responded to a similar survey instrument during the Hawaiian Invitational Billfish Tournament in August of 1994. In all three groups, there were three collections of species that were clearly defined. Usually, the three marlins were grouped together with spearfish and sailfish. The second group consisted of the tunas and the ono and mahimahi. The shark stands alone in the third group. The reasons given for these grouping patterns were:

Group 1: black marlin, blue marlin, striped marlin, spearfish and sailfish

Profit

- "same family"(4)
- "never caught"
- "least common species"
- "don't know much about them"
- "not regularly available, or what we regularly go after"(2)
- "They are good eating."

- "all caught by themselves, not swimming around with the others"
- "real fish"
- "all billfish, all noble fish"
- "more of a gamefish than a moneymaker—probably the most threatened, for us as charter, these are the ones that our customers dream of catching"
- "they are all marlin, all I am trying to catch"
- "these are the big game fish"

Non-Profit
- "tough, sinewy"
- "never caught"
- "secondary economic value"
- "dangerous, hard on gear"
- "not after, or looking to go after"
- "rarer to catch"(2)
- "no market value"
- "prestige"
- "billfish"(2)
- "sports"(2)
- "sportfish"

Angler
- "billfish"(5)
- "really not food fish in my opinion"
- "primarily would consider them a sport fish... would release them"
- "gamefish, hell of a lot of fun to catch"
- "would rather catch this group—this is big game fishing"

Group 2: ono, wahoo, skipjack tuna and `ahi (yellowfin tuna)

Profit
- "bait"(2
- "good eating white fish"(2)
- "these are the secondary targets, these are the money fish"
- "more money makers than anything else. As charter captains, we see these as fillers, they keep people happy"
- "they are the more edible and tasty gamefish"
- "That is what you find around floating debris."
- "what I catch (shoreline to 80 fathoms)"
- "they all kinda rely on each other, generally finding all together"

Non -Profit
- "caught before"
- "#1 pelagic I like to eat"
- "the best eating"
- "highest economic value, holds price, #1 target fish"

- "fish I have caught and like to eat"
- "food fish"(3)
- "good eating fish"(2)
- "more abundant, easy to catch, good food value"
- "market fish"(3)
- "highest commercial value, most plentiful"

Angler
- "food fish"(3)

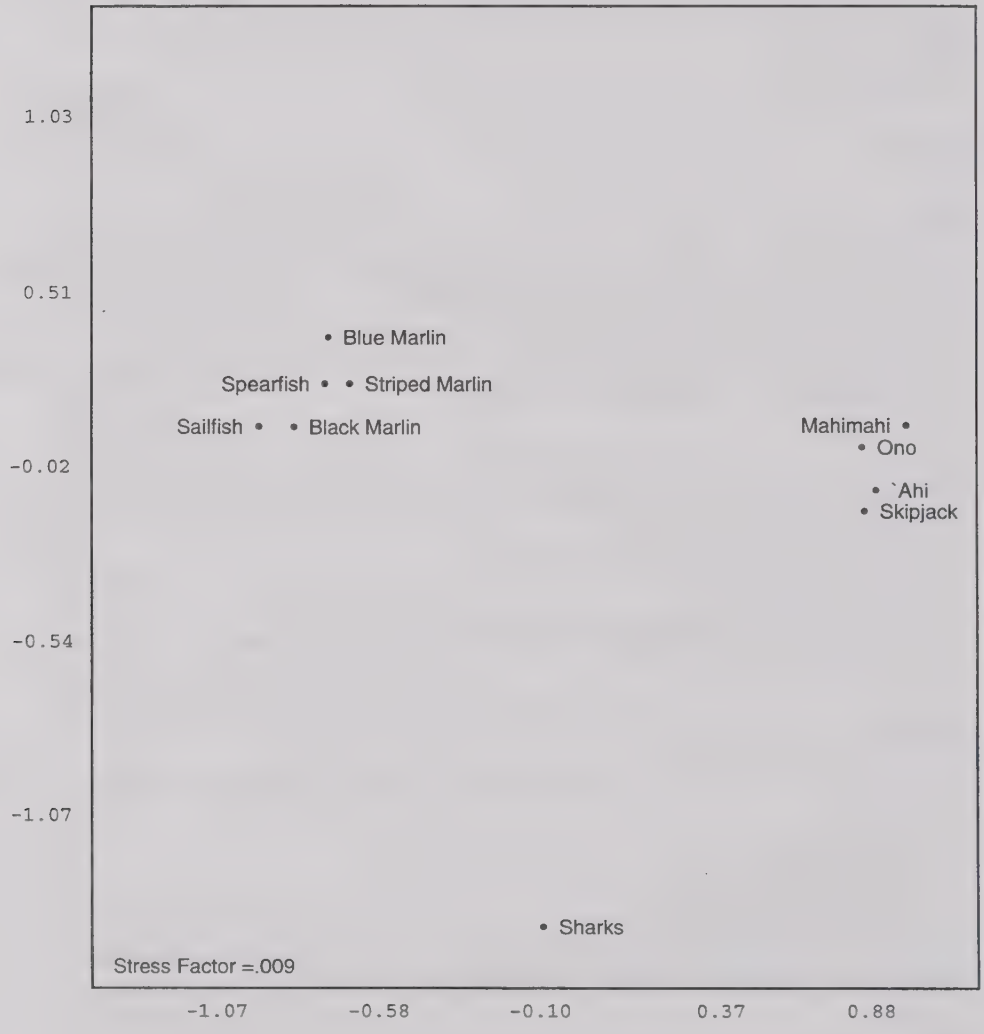
Group 3: shark

Profit
- "to be avoided at all times—Hawaiians think they are god, I think they are a dog. They have a very important place in the ocean."
- "the lone wolf—we don't see too many"
- "I have no interest in them. I don't care about them. I won't catch them. I won't kill something that I or anybody else won't use."
- "shit"
- "not a gamefish, it is a monster of the deep. We don't eat the ones out here."
- "To me it is not a gamefish, almost zero commercial value. If it was up to me, we would never deal with them."
- "shark is a shark, bottom of the barrel"
- "it is its own species"
- "by-catch, I am not fishing for this, it is not a sportfish to me"
- "This is a scavenger"

Non-Profit
- "don't care to eat"(2)
- "trash"
- "don't interest me"
- "sharks eat all of them"
- "no value, do not fish for"
- "predator, causes trouble"(2)
- "bad reputation, feared species, low commercial value"

Angler
- "different species entirely"
- "Quite honestly, I've never really fished for sharks. They are being overfished for the wrong reasons... in need of serious considerations."
- "more or less the vacuum cleaner of the sea... not really a sporting fish"
- "dirty sport fish"
- "special category of their own"(3)
- "I hate sharks, they are filthy creatures."

Figure 5.1 Profit Fishermen's[1] Cognitions of Pelagic Species
(Multi-dimensional scaling, n = 19)

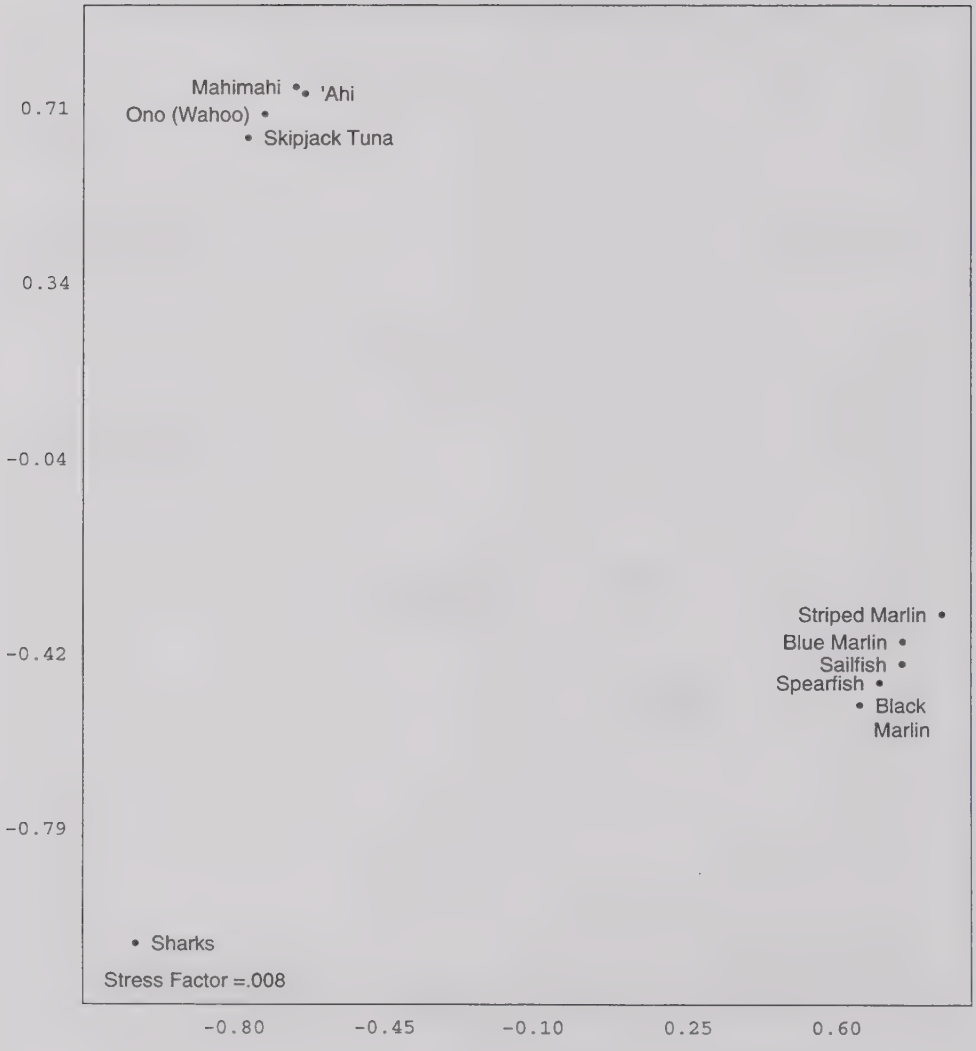


[1] "Profit fishermen" refers to the questionnaire respondents who reported more than 51% of annual income from fishing.

Figure 5.2 Non-Profit Fishermen's[1] Cognitions of Pelagic Species
(Multi-dimensional scaling, n = 19)

[1] "Non-profit fishermen" refers to the 19 questionnaire respondents who reported that less than 5% of annual income comes from fishing.

Figure 5.3 Angler[1] Cognitions of Pelagic Species
(Multi-dimensional scaling, n = 19)



[1] "Angler" refers to the sample of 1994 HIBT tournament participants.

6.0 RESEARCH IMPLICATIONS

This report has focused on the sociological and cultural character of troll and handline fishing in Hawai`i. Results presented confirm the theme of fishing to be pervasive and persistent in Hawai`i society. The importance of fishing transcends the fishing trip, and extends to the selling of fish, to the familial and friendship rituals by which fish are shared, and to the informal talk story rituals in which the relationship of people to fish is a continuing topic of examination.

Major results of Phase I research presented in this report include:

- the development of a conceptual framework (Section 3.0) expressing the sociological elements of a fishery
- a description of the institutional environment (Section 4.0) in which pelagic fishery management policies are designed and implemented
- a description of geartype, seasonal, and species patterns of fishing (Section 5.0)
- a discussion of the social and cultural dimensions that underlie troll and handline fishing (Section 5.0)
- the identification of pressing fishery issues as these are perceived by troll and handline fishermen (Section 5.0)

It is envisioned that these findings will prove to be useful to two primary audiences. The first audience is composed of fishery managers with the responsibility of designing and implementing policies under the Magnuson Fishery Conservation and Management Act of 1976 (MFCMA). In Hawai`i, the leading federal entity with Magnuson Act authority is the Western Pacific Regional Fishery Management Council.

The Western Pacific Council manages its pelagic fisheries in the 3-200 nautical mile US Exclusive Economic Zone through the annual re-consideration of a fishery management plan oriented to the MFCMA concept of optimum yield (OY). The act specifies that OY be:

> "... prescribed on the basis of the maximum sustainable yield... as modified by any relevant economic, social, or ecological factor." (Sec. 3[21])

Amendments to the act in 1990 expanded the role for social science analyses in the management process by requiring that fishery management plans include "fishery impact statements" that assess effects of management actions on "participants in the fisheries affected by ... plans." (Sec. 303[a][9]).

For the Western Pacific Council to follow this MFCMA mandate, the initial sociological conditions of fisheries must be measured. Results presented in this report propose concepts pertinent to this task and begin to do the job.

Over the last several years, a subcommittee of the Western Pacific Council's Scientific and Statistical Committee sought to identify social science research priorities concerning the pelagic fisheries. Table 6.1 displays a matrix subsequently adopted by the Council. Pelagic fishery management plan objectives are listed in the first column; the first row partitions the fishery into its social components. The remaining cells in the matrix represent potential "research windows."

Examination of the table shows that high Council priorities include:

- baseline/profile of commercial harvesting practices; importance and value of activities and experiences (all social sciences; #1)
- baseline/profile of recreational harvesting practices; importance and value of activities and experiences (all social sciences; #2)
- identify database variables (commercial/recreational/traditional harvesting); establish mechanism for database management (all social sciences; #7)
- baseline/profile of traditional harvesting practices; importance and value of activities/experiences (cultural and social only; #8)
- cross-industry conflicts; opportunity costs, value conflicts (all social sciences; #12)

The concepts and social and cultural patterns in this report match well with Council research priorities. It is to be hoped that this information will help managers understand diversity in the harvesting sector. The better that the behaviors and aspirations of fishermen are documented, the easier will be the implementation of pelagic policies.

The second audience that might benefit from this report consists of social scientists. Compared to the field of fishery biology, the field of fishery social science is its infancy. Given the centrality of OY in fishery management under the MFCMA, it is a very serious problem that so few cultural anthropologists and sociologists are familiar with fishery science in general and with Western Pacific Management Council fisheries in particular.

With this problem in mind, it is hoped that this report will stimulate social scientists to apply their expertise to fishery issues. In particular, it is important that future cultural and social studies complement, rather than repeat economic studies. Finally, it is also hoped that this study can make a contribution in its application of models of social and cultural processes to fishery problems.

Table 6.1 Social Science Research Priorities*—Pelagics FMP

FMP OBJECTIVES	Harvesting Element	Distribution Element	Management Element	Public Element
2. Promote domestic fishery values by enhancing opportunities for:				
2a. Satisfying recreational fishing experiences	**baseline/profile of harvesting practices; importance and value of activities/experiences (#2)**	**baseline/profile of (market and non-market) distribution practices (including gray marketing); importance and value of activities/experiences (#4)**	**analysis of consequences of a range of (feasible and implemented) management regimes/actions (#15)**	survey and estimation of non-consumptive ocean uses.
2b. Continuation of traditional fishing practices for non-market personal consumption and cultural benefits	**baseline/profile of traditional harvesting practices; importance and value of activities/experiences [cultural and social only] (#8)**	**baseline/profile of (market and non-market) distribution practices; importance and value of activities/experiences [cultural and social only] (#13)**	baseline/profile of traditional management practices; importance and value of activities/experiences [cultural and social only] baseline/profile of non-consumptive ocean uses analysis of consequences of a range of (feasible and implemented) management regimes/actions.	identification of social networks of non-consumptive ocean users
2c. Domestic commercial fishermen, including charter boat operations, to engage in profitable fishing operations	**baseline/profile of harvesting practices; importance and value of activities/experiences (#1)** **profiles of supplier-harvester relationship (#10)** cost of meeting health and safety standards	**baseline/profile of (market and non-market) distribution practices (including gray marketing); importance and value of activities/experiences (#6)** profiles of supplier-(market and non-market) distributor relationship analysis of impacts of meeting health and safety standards; (leakage) analysis of impacts of foreign and domestic industrial fisheries	**analysis of consequences of a range of (feasible and implemented) management regimes/actions (#9)**	analysis of industry-public conflicts (protected species, environmental protection, seafood inspection)
3. Diminish gear conflicts	**cross-industry conflicts; opportunity costs; value conflicts (#12)**	estimation of losses or gains of altered fishing practices on market volume	analysis of cross-authority conflicts [cultural and social only]	estimation of the cost to non-fishing ocean users of fishing practices
4. Improve statistical base for management	**identify database variables; establish mechanism for database implementation (#7)**	identify database variables; establish mechanism for database implementation	database management	investigation of methods for surveying the general public on fishing issues
5. Promote regional or international fishery assessment and stock conservation	baseline/profile of harvesting practices; importance and value of activities/experiences	**baseline/profile of (market and non-market) distribution practices; importance and value of activities/experiences (#11)**	analysis of cross-authority conflicts [cultural and social only]	analysis of interests of non-governmental organizations and non-profit interest groups [cultural and social only]
6. Preclude waste in fishing operations	analysis of bycatch and discard mitigation [economic only]	determination of alternative markets	estimation of social organization of mitigation	estimation of public sentiment and value concerning waste/by-catch
7. Promote domestic marketing	baseline/profile of existing sales patterns [economic only]	**profile/baseline of (domestic and international) industry (#15)**	analysis of cross-authority conflicts (trade agreements)	analysis of impacts of boycotts on domestic market

* Additional cross-element research priorities methodological/modeling/conceptual/interdisciplinary development (#3) equity/efficiency trade-offs (#14)

Research proposals should provide justification for techniques of data collection and analysis, scale of project, sites, key concepts, etc.

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Appendix 1. Kewalo Basin Description

The Boats

The 18 sportfishing charter boats in Kewalo Basin range in size from 35 feet to 61 feet. Many of the boats are Sampans. A Sampan is a custom built rough water vessel that is modeled after the Hawaiian Aku boats. Some Sampans are *haole* Sampans which are similar in build and style but have a larger, more spacious cabin. The following is a list of the boats in Kewalo Basin, their size, and respective make: *Pacific Blue* 35' Bertram, *Brooke Kay* 38' Bertram, *Sea Versi III* 44' Pacifica, *Fishawk* 42' Uniflyte, *Kahuna Kai* 50' custom, *Aukai* 53' Sampan, *Seahawk* 41' Tollycraft, *Maggie Joe* 53' custom, *Blue Nun* 42' Cris Craft, *Mele Kai* 44' Funai Sampan, *Alii Kai* 48' custom, *Lynell* 40' Sampan, *Kamome* 53' Sampan, *Kuu Hapala* 55' Sampan, *Ilima V* 42' Hatteras, *E.L.O.* 38' Bertram, *Golden Eagle* 60' custom, *Kono* 61' Sampan.

The charter boats in Kewalo Basin with the exception of three, *Maggie Joe, Golden Eagle,* and *Kono*, are "six-pack" vessels. "Six-pack" vessels are licensed to take a maximum of six passengers, a limitation due to insurance costs. The three exceptions have obtained US Coast Guard certification to carry 25, 30, and 32 passengers, respectively. This allows these vessels to accommodate larger parties for sunset cruises and whale watching, in addition to multi-passenger sportfishing trips.

The Owners

Most charter boats have a sole owner who is the captain. Fourteen of the 18 vessel owners run their vessels either part or full time. The *Fishawk, Seahawk, Ilima V,* and *Kona* are not currently run by their owners. The *Seahawk* and *Ilima V* have hired captains because the owner is a captain of a second boat in a two-boat business. In the case of the *Kono* and the *Fishawk*, the owner distributes paychecks and will occasionally use the boat for his own personal use, or to go *holoholo*.

The Crew

The captains and deckhands are usually hired from other boats in the harbor. Position openings are very rarely advertised publicly; generally, they are advertised by word of mouth. It is common practice in the harbor for a captain or deckhand to work on several boats before taking a full-time position on one vessel. Captains are more permanent than deckhands because captains are often vessel owners. Currently in Kewalo Basin, there is one "slipper skipper," a captain who works for different vessels.

Deckhands are hired based on experience with boats, handling large fish, and reliability. The deckhand is usually hired by the captain in conjunction with the owner. The deckhand's role on the boat is to catch fish and to entertain the customers. The work-day is often 10 to 12 hours, and the pay is minimal.

Each boat in the harbor runs with one captain and one deckhand. If a boat runs seven days per week, it may have a second captain and deckhand that work weekends.

Advertising
Most boats in Kewalo Basin rely on the yellow pages or brochures distributed by advertising agencies. Five boats have contracts with sales agents on the mainland or in Japan who supply clients. Some boats advertise with coupon ads in tour books distributed in Waikiki streets and hotels. In addition, some boats employ "booth girls"(regardless of gender) to sell charters from a small office-booth located on the dock. Currently 12 charter fishing booths exist on the front line in Kewalo Basin. The four booths that have full-time booth girls are the busiest boats. The "booth girl" answers the telephone, answers questions about fishing, and convinces tourists to charter their boat. The "booth girl" is usually paid by commission on sales, and can book charters on other boats when his/her boat is already booked or not running.

Trip Types and Costs
All boats run private charters on a full day (eight to ten hours), three quarters of a day (six to seven hours), or half day (4 to 5 hours) basis, known as FDX, 3/4DX, and 1/2DX respectively. The standard cost is $550.00 for a FDX, $500.00 for a 3/4DX, and $450.00 for a 1/2DX. The price of the charter covers all equipment, license, bait, tackle, cooler and ice for up to six passengers. The charter is asked to provide their own food and beverages. The *Maggie Joe, Golden Eagle,* and *Kono* charge slightly more due to their larger size and also charge a per person rate for each additional passenger over the standard party size up to the certified limit.

All boats offer "share" charters as well. A share party boat will take a maximum of six fishermen. The rods are assigned randomly by card pick in the morning and are rotated during the day as fish are caught. The cost of a share is $115.00 per person for the full day fishing (eight to ten hours). The price includes the same materials as an exclusive charter, except there is only one fishing pole per share. A minimum of four shares is necessary for the boat to break even. Occasionally, boats will be chartered for overnight or multi-day inter-island trips.

Fish Distribution
The standard fish policy in Kewalo Basin is 50-50 for fish up to 100 pounds. Fish over 100 pounds stay with the boat. The charter keeps half and the boat keeps half. This is sometimes a contentious issue, since many mainland sportfishery charter services give all of the catch to the charter. The fish that the boat keep is sold by a local fish auction, and the proceeds are divided between the captain, the deckhand, and equipment costs of the boat. The crew may also take fish home for personal consumption.

Appendix 2. Pelagic Fishery Knowledge

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1.0 Systems of Knowledge

A system of knowledge can be defined as an assemblage of interrelated facts and principles which form a complex or unitary whole. Knowledge systems are a shared conceptual scheme; a particular way of perceiving and structuring reality or the multiple realities of life. Modes of knowledge production may be theoretically and methodologically diverse but all knowledge is subject to social influences. In other words, socially contingent constructions provide the foundation for establishing various ways of knowing about the world.

1.1 Scientific Knowledge Systems

The scientific system of knowledge can be characterized as a formalized form of knowledge production. Scientific knowledge places an emphasis on formal models, written procedures, replicable results, positivistic methodologies, and cumulative bodies of scientific findings. Scientific knowledge most often seeks universal rather than local understanding.

1.2 Folk Knowledge Systems

In contrast to the scientific mode of knowledge production, the folk system of knowledge is relatively less formalized. *Local knowledge, traditional ecological knowledge*, and *indigenous knowledge* all fall under the broad rubric of the folk knowledge system.

1.2.1 Local Knowledge

Local knowledge is locally based experiential knowledge. What constitutes knowledge as *local* is that it is derived from the practical and direct experience of a labor process "which is itself shaped and delimited by the distinctive characteristics of a particular place with a unique social and physical environment" (Kloppenburg 1991:528). Further, local knowledge can be characterized as knowledge contained in the heads of those that are intimately familiar with the natural environment in which they labor.

1.2.2 Traditional Ecological Knowledge

Systems of *traditional ecological knowledge* provide insight into human-environment relationships:

> Traditions evolve—usually over many centuries—within a given locality, habitat, or place. Traditions are transmitted from one generation to the next generation of people who live in, and by means of, the local environment. New ideas and techniques may be incorporated into a given tradition, but only if they fit into the complex fabric of existing traditional practices and understandings. Thus traditions are enduring adaptations to specific places (Hunn 1993:13).

1.2.3 Indigenous Knowledge

Indigenous knowledge is a term often found in anthropological and international development literature. Indigenous knowledge is synonymous with local knowledge and traditional ecological knowledge but it distinctly conveys a long standing familiarity with place and biota. Ethnoscientists have found that indigenous peoples the world over are exceedingly keen observers of the natural environment (Hunn 1993:14).

2.0 The Relevance of the Study of Folk Knowledge

The academic literature on folk knowledge suggests that "science as currently constituted provides neither a complete, nor an adequate, nor even a best possible account"(Kloppenburg 1991:520) of the sphere it claims `to know'. Indeed, it is an historical over reliance on this partial knowledge that has inhibited the identification and legitimization of alternative sources of knowledge production.

> A growing number of biological scientists are concerned that the reductionist and positivistic approaches characteristic of modern science constrain pursuit of unorthodox but potentially productive research initiatives, obscure important connections between organisms and phenomena, and actively inhibit achievement of holistic understanding of ecological systems (Kloppenburg 1991:521 citing Allen and Starr 1982; Levins and Lewontin 1985; MacRaeet al. 1989; Odum 1989; Prigogine and Stengers 1984).

Local knowledge includes those "sources which now have no voice, speak without authority, or simply are not heard" (Kloppenburg 1991:520) in contemporary scientific discourse. Some anthropologists, sociologists, and feminists have questioned the dominant role scientific knowledge occupies in our understanding of reality, in the hopes of restructuring a "successor science" (Harding 1986) which would include other ways of producing knowledge and "to effect new articulations and combinations between modes of knowledge production whose complementarity is now obscured" (Kloppenburg 1991:525).

Central to the task of restructuring a "successor science" is the importance of legitimating the value of producing knowledge through "personal experience" (Harding 1986:240) that is necessarily and specifically "local" in character (Smith 1987). Thus, local knowledge relies upon a production of knowledge, based upon both aggregative and personal experience, is a fundamentally different kind of knowledge production than that commonly called scientific. As

Kloppenburg (1991:527) points out, it is important to note the epistemological distinction between the two:

> True, in one sense all knowledge is both personal and sensuous inasmuch as it must be obtained by individuals who have no access to the natural world except through their senses. But while the Ojibwa herbalist and the NIH biochemist both rely on sensuous observation to obtain knowledge, they do so from quite different epistemological stances (as well as within different social contexts, with quite different objectives, and with quite different tools).

This epistemic distinction has been elaborated by a wide variety of analysts, from phenomenologist philosophers to contemporary anthropologists, with a range of paired concepts (from Kloppenburg 1991:527-528): "tacit knowledge/scientific knowledge" (Polanyi 1966), "science of the concrete/science" (Levi-Strauss 1962), "life-world knowledge/scientific knowledge" (Bohme 1984; Husserl 1970), "craft knowledge/scientific knowledge" (Braverman 1974), "practical labor/science" (Bittner 1983), "folk wisdom/processed knowledge" (Krimsky 1984), "indigenous knowledge/scientific knowledge" (Richards 1985), "working knowledge/scientific knowledge" (Harper 1987). It is ironic that such an epistemic distinction should now exist, since science originally grew out of local ways of knowing. The biochemist and obstetrician were once called herbalist and midwife.

2.1 The Complementarity of Scientific and Folk Knowledge

Scientific knowledge in its emphasis on formalized universal principles, is often disconnected from the variability of local systems but, on the other hand, the contextual detail that local knowledge brings to the understanding of a particular place or event, generally speaking, may have little utility outside of that place or event. Local knowledge and scientific knowledge are "complementary in their strengths and weaknesses. Combined they may achieve what neither would alone" (Chambers 1983:75).

While the degree of complementarity of scientific and folk knowledge is an empirical question, it has been argued that knowledge that "accumulates in time-bound fashion through aggregative experience, and is holistic" has been under utilized (Kloppenburg 1991:537). Anthropologists and sociologists have been concerned with documenting the social context in which local (or "traditional" or "indigenous") knowledge is generated, transmitted, and used.

3.0 Pelagic Fishery Domains of Folk Knowledge

Pelagic fishery domains of folk knowledge concern anything which informs fishermen about a fishery. "In elementary terms, a fishery exists when a human population purposively engages in a relationship with a `fish' population" (Miller 1994:3/footnote 5). Folk knowledge of a pelagic fishery would encompass what fishermen know about the social organization of a fishery management system (*e.g.*, harvesting, processing/marketing, public, and authority sectors), conservation, and fishing skills.

3.1 Local Knowledge and Fishery Management

Folk knowledge and scientific knowledge are essentially complementary but folk knowledge has been an underutilized system of information in fisheries management.

> Because local technical knowledge is "pre-adaptive to its physical and human ecology" (McCorkle 1989:8), its elaboration and improvement is more likely than exogenous innovation to be environmentally and socially appropriate and therefore more likely to be sustainable in the long term. Moreover, intimate sustained engagement with their means and conditions of production endow [fishermen] not only with deep knowledge of local particularities, but also with a holistic and systemic understanding of local [fisheries] that reductionistic science cannot approximate (Kloppenburg 1991:534).

There are few studies which concentrate on traditional fishing activities in the US Pacific, and fewer that deal exclusively with Hawai`i. The ethnographic studies that are available to us are, typically, records of small-scale, less-developed island communities in Oceania and Southeast Asia. This literature reflects that local knowledge is indeed "local" in that it is rich with the social and environmental context from which it is produced. There are, however, underlying themes that will be extrapolated for the purposes of informing this section's more general theme.

Small-scale, less-developed, low-latitude island societies traditionally share common territory whose subsistence livelihood is based on customary rights and obligations. Fish and fisheries occupy a significant position in these cultures. Fisheries resources are considered to be a common property resource (Gale & Miller 1985:656; McCay & Acheson 1987) and are socially regulated by local authority and kinship ties. "What sets most traditional societies apart is their spatial and cultural autonomy, local, internally-oriented economy and society, and life-styles derived from a long and continuing adaptation to local environments and adjacent peoples" (Nietschmann 1983:130).

This is not to say, however, that traditional societies are somehow static and that traditional knowledge has not undergone continual adaptation or recontextualization due to new influences. Quite the contrary; it is axiomatic that all cultures are constantly changing and most Pacific Island societies possess a long legacy of colonial contact. What is traditional is that local knowledge is based on a long-term familiarity with place and biota and that this knowledge is considered worthy of transmission from generation to generation. It is this transmission of knowledge which elevates it to the status of traditional. As Miller (1994) points out, "The term cultural pertains to what it is (e.g., mores, rules, facts) people `know' in order to behave in a society. In a manner of speaking, these knowledge bases are the essence of what is often called custom or tradition."

3.2 Local Knowledge and Conservation

Over hundreds, perhaps several thousand years, Pacific islanders devised appropriate technologies and methods of sustainable resource harvest to conserve and protect their limited island-reef resources. The success of some of these adaptations stands in sharp contrast to destructive resource harvest methods employed by Europeans and others, beginning in the sixteenth century (Nietschmann 1983:131 citing Fosberg 1973 and Elliott 1973).

That traditional natural resource management is effective and sophisticated is underscored by fact that fisheries are considered common property resources and are socially regulated by local authority. Traditional knowledge included ways to manage resources without creating severe environmental alteration. How this was accomplished has been a primary concern of R.E. Johannes, a tropical fisheries biologist. He concluded that islanders, "devised and practiced almost every basic form of modern marine fisheries conservation measure centuries ago, long before the need for marine conservation was even recognized in western countries. (It was only about 90 years ago that western biologists first began to realize that marine fish stocks were vulnerable to overfishing)" (Johannes 1982:259). "These conservation measures included closed seasons, closed areas, quotas and size restrictions, ownership of species, ownership and control of fishing techniques, restricted entry, and reef and lagoon tenure" (Nietschmann 1983:131-132).

3.3 Local Knowledge and Fishing Skills

James M. Acheson, has determined in his "Anthropology of Fishing" (1981), that experienced fisherman focus much of their time and attention to developing skills which will enable them to find concentrations of fish to be caught. He has delineated four different kinds of skills:

> First, the key to being able to locate concentrations of fish is to know where those concentrations are apt to be and to be able to find those spots.
>
> Second, fishermen have a good knowledge of the ocean itself—its depths, currents, reefs, types of bottom.
>
> Third, fishermen have a detailed knowledge of the species of fish they are seeking--their habits, breeding cycles, enemies, food supply, feeding habits, and especially migration patterns and habitats.
>
> Fourth, fishermen have to know what other fishermen know and how they will behave. [1981:290-291]

It is important to note that what pertains to a fishery is not just what it takes to know in order to catch fish, but it is just as essential to know what it is to be a fisherman. Therefore to above skills we would suggest:

> Fifth, fishermen have to know about the management and authority structures in which their activities are embedded.

While fishing activity in traditional island societies encompasses the harvesting of a wide range of marine resources, the following section will concentrate on off-shore, deep-sea fishing, primarily for *`ahi* or yellowfin tuna (because it is most relevant to future Hawaiian research) and *aku* or skipjack tuna (because it is the most documented deep-sea fish in traditional Pacific Island societies). For a comprehensive and popular treatment of deep-sea fishing in Hawai`i the books by Jim Rizzuto are particularly informative.

3.3.1 Fish Behavior

Utilizing Acheson's delineation of relevant fishing skills necessary to locate and catch, this section begins to explicate what traditional Pacific island fishermen know in this regard.

Pacific islanders know that tuna are a migratory, seasonal, mid-water to surface, school fish. In other words tuna travel the ocean highways (currents) in large groups and visit the islands in a predictably seasonal fashion. R.E. Johannes, who has researched the migratory habits of yellowfin and skipjack tuna in Micronesia has found that they "make predictable daily migrations to and from the waters near the islands, and these migrations vary in character with the season" (1981:108). The relative strength or speed of prevailing currents varies seasonably and appears to influence the daily migration pattern and cause the fish to concentrate in different areas. "During January and February at Tobi, for example, skipjack, yellowfin, and needlefish move offshore after midnight and return by mid-to late afternoon... In the fall large yellowfin dominate the catch. They tend to stay in deep water, moving off-shore about 3:00 A.M. and returning in the mid-afternoon. Yellowfin are also caught by dropline fishing to depths of 100 meters or more in the reduced currents" (Johannes 1981:108-109) of calm waters at this time. Local experience points to the fact that daily migratory patterns of tuna are influenced by lunar cycles. "The phase of the moon reportedly has some influence on the timing of these movements; fish are said to leave the island later during the dark nights around the new moon and return later" (Johannes 1981:108).

Johannes found similar offshore—inshore movement patterns on other Micronesian islands. "The seasonal timing of these movements varies from island to island, presumably because of seasonal differences in current and wind conditions" (Johannes 1981:109). Johannes states that he searched the scientific literature to find to what extent local fishermen's knowledge of daily tuna migrations has been validated by biological research:

> Much work has been published on long-distance seasonal migrations of tuna in the Pacific. But I could find only one paper that relates to daily, repetitive migrations near islands. Marine biologist Henry Yuen (1970) fixed an ultrasonic tracking device to a skipjack tuna near Hawaii and monitored its movements. When returned to the water the fish rejoined its school. Each night the fish left the shallow bank where it was caught and traveled over deep water for distances of up to sixty-six miles before returning to the bank by dawn. The pattern of movement described by Yuen on the basis of observations on a single fish is the same as that described by fishermen for populations of fish for three different species. Their testimony indicates that these movements vary seasonally, are related to prevailing current strength and direction, and are not just a local Hawaii phenomenon (1981:109).

The above quote illustrates the complementarity between local knowledge and scientific knowledge. It also highlights the inherent complexity of taking a strictly biological approach to the study of wild wandering fish. It is perhaps obvious, that an understanding of pelagic fish must be supplemented by knowledge gained in a time-bound, aggregative, and experiential fashion.

"Tuna fishing is exciting, it comes fast and furious. Fish are always moving and yellowfin tuna move very fast. If fish are hungry, they will hit your bait. If one fish hits, the rest will hit and you have a veritable feeding frenzy" (Rockom 1995). Indeed, *`ahi*, the Hawaiian word for yellowfin tuna means "fire", "because it pulled the line over the side of the outrigger canoe so fast that the wood smoked as a result of the friction. It takes the lure with tremendous speed and in no time takes out hundreds of yards of line" (Hosaka 1973:99). On Tobia, where Johannes conducted his research, he says, "Of all activities connected with the sea, Tobian men get most pleasure out of trolling from sailing canoes. When the tuna are there the pace of island life quickens... Working their way gradually offshore... they search for the feeding birds or the small fish breaking to surface that signal the presence of bigger fish below" (1981:91).

3.3.2 Ko`a and Information Management

From experience, Pacific island fishermen have learned that a number of things indicate where tuna may be concentrated. These include seabirds, surface-feeding bait fish, floating logs, and deep sea mounds. Underwater rocky protuberances or sea mounds are called *ko`a* in Hawaiian. "*Ko`a* is a deep sea mound where fish gather to feed and where they can be caught in great numbers" (Kawaharada 1992:83). *Ko`a* is also defined as fishing grounds (Pukui & Elbert 1986:156). Given the fact that fish are known to gather around these deep sea mounds, it is logical that *ko`a* mark exceptional fishing locations. We have an account from 1883, by Emma Beckley, which illustrates an intimate knowledge of the environment possessed by ancient Hawaiian fishermen:

> For deep sea fishing, the hook and line are used without a rod, and our fishermen sometimes use lines over a hundred fathoms in length. Every rocky protuberance from the bottom of the sea for miles out in the waters around the islands was well known to the ancient fishermen, and so were the different kinds of rock fish likely to be met with on each separate rock. The ordinary habitat of every known species of Hawaiian fish was well known to them. They often went fishing so far out from land as to be entirely out of sight of the low lands and mountain slopes and took their bearing from the different mountain peaks to locate the rock which was the habitat of the particular fish they were after (Beckley 1883:6-7 from Kawaharada 1992:85).

A further account from Abraham Fornander (1916-1919: Vol. 6:186-7 from Kawaharada 1992:85) documents the complexity of knowledge necessary in locating *ko`a*. To put it simply, however, "When the landmarks on shore and the landmarks in the background come into line, the *ko`a* is located."

While fisheries might be considered a common property resource there are many "instances where fishing spots are not formally owned, but where secrecy and information management operate to effect some property rights over resources... in most societies fishing rights involve control over `fishing space'—not the resource itself" (Acheson 1981:281). Location of *Ko`a* are illustrative of this ownership of "fishing space." There is a great deal of secrecy involved with

this knowledge and a great deal of discretion involved in its transmission to others. We have an account from 1869, by Samuel Manaiakalani Kamakau (1976:75-76), which illustrates this point nicely:

> Those who wished to fish in the deep ocean sought out these fishing grounds and kept them secret. *Ka po`e kahiko* (the people of old) regarded their fishing grounds, *ko`a huna*, as "calabashes and meat dishes" (*he `umeke a he ipu kai*) and as "grandparents" (*kupunakane a he kupunawahine*) [sources of provisions], and could be robbed and beaten before they would reveal their locations. They pointed out their secret fishing grounds only to their own children. The locations of most of the deep-sea *ko`a* have been lost; only a few remain known, as the knowledge of their whereabouts has lessened, and the youth of today have not been taught their locations.

In the case that other fishermen may be watching, Kamakau proceeds to recount (1976:79) an elaborate scenario of avoidance behavior to insure that secret fishing grounds do not become common knowledge. In "Sea Tenure in Japan and the Southwestern Ryukyus" (1989:356-358), Ruddle and Akimichi, describe similar notions of ownership of "fishing space", secrecy as information management, and avoidance behavior. Johannes also mentions that Pacific islanders try to keep their knowledge of marine resources secret, but views this behavior as a method of conservation. "Secrecy probably functions as a conservation measure; if the knowledge needed to exploit a particular area or species is restricted, the likelihood of over exploitation is lessened. (Conversely the `stealing' of a method helps reduce the risk of it being lost if its legitimate owner dies without heirs)" (1981:89).

3.3.3 Fish Aggregation Devices (FADs)

FADs (fish aggregation devices), *ko`a*, floating logs, flotsam and jetsam, even islands, are considered as sources for fish aggregation. What distinguishes FADs from other fish aggregators is that they are an artificially introduced device designed to waylay a normally nomadic fish (tuna) in order to increase catch (Rockom 1995). What distinguishes FADs from *ko`a* is that FADs are temporary, man-made devices, whereas *ko`a* have been there for thousands of years and are natural. As a recent exogenous innovation, little is known about the effect FADs may have on daily migratory habits of tuna. Moreover, FADs are visible and often charted on maps, making them potential destinations for all fishermen, as opposed to *ko`a* which are typically underwater and their whereabouts not necessarily common knowledge. As one extreme, this intermediate technology could possibly lead to overfishing and stock failure. In the least, FADs may certainly be seen as alternate aggregation sites from otherwise traditional fish aggregation locations, thereby impacting, perhaps disruptively, an existing socioeconomic system. The study and application of local fishermen's knowledge would be essential in informing fishery management and development issues such as these.

4.0 Conclusion

There is a growing concern in the world at large that traditional knowledge may be in danger of forever being lost. I have attempted to show that traditional knowledge is inherently intimate, adaptive, and conservationist in nature. Local knowledge differs from scientific knowledge in its particular connectedness to locality and its richness of contextual detail. Cultures are constantly changing, knowledge is lost, knowledge is gained, nothing stays the same. Michael Lieber recently

published an ethnography (1994) about social change, yet it is a diachronic investigation of the importance of fishing in the cultural system of a Polynesian atoll:

> The constraints on traditional fishing activities had been embedded in a hierarchically ordered social and ritual system that formed their context. When that system fell apart, fishing activity was recontextualized as part of a new order formed through recombination of old and new institutions resulting in fishing activity being much more integrated into community decision making than it had been in the past" (Lieber 1994:166).

Institutionalized natural resource management has replaced traditional management systems in most societies. This is change. Gale and Miller (1985:666-667) have shown that there is an over reliance on the scientific production of knowledge in the institutionalized fishery management system. Traditional management systems are based on local knowledge. Integration of local knowledge in the dominant scientific discourse is a change that should be embraced wholeheartedly. To reiterate what Chambers (1983:75) said, "Combined they may achieve what neither would alone."

Appendix 3. Survey Instrument

Pelagic Fisheries Research Program
Joint Institute for Marine and Atmospheric Research
University of Hawaii at Manoa

ver. 1.3 m.l.miller
date ___ place ___
fieldworker _____

HAWAI`I STYLE FISHING: OFFSHORE TROLL AND HANDLINE FISHERIES

This research addresses tuna, billfish, and other large pelagic fisheries in Hawaii under the jurisdiction of the Western Pacific Regional Fishery Management Council and is directed at understanding the many ways in which **fishing brings people together** and how the **fishing experience is important to people**.

I. BACKGROUND

1. Captain ____ Crew ____
   Charter captain ____ Charter crew ____ Angler (on charter boat) ____
2. Male ____ or Female ____
3. Age ____
4. City, State, and Country of residence _____ zip _____
5. Primary occupation _____ Secondary occupation_____
6. Boat length _____
7. Do you own the boat you fish on? _____
8. Is the boat you fish on:
   kept in a marina slip? ____
   tailored to fishing locations? ____
   moored (buoys) in a marina or bay? ____

9. How many times each month last year did you fish for pelagics by:

trolling:	Jan _	Feb _	Mar _	Ap _	May _	June _	July _	Aug _	Sept _	Oct _	
	Nov _	Dec _									
day (palu-`ahi):	Jan _	Feb _	Mar _	Ap _	May _	June _	July _	Aug _	Sept _	Oct _	
handlining	Nov _	Dec _									
night (ika-shibi):	Jan _	Feb _	Mar _	Ap _	May _	June _	July _	Aug _	Sept _		
handlining	Oct _	Nov _	Dec _								

10. What other ways did you fish last year?

deepsea handline (bottomfish)	_____	spearfish	_____		
inshore handline (opelu, akule, etc.)	_____	spearfish	_____		
netfishing	_____	spearfish	_____	longline (flagline)	_____
aquarium fish collection	_____	aku boat	_____	other	_____

11. Which pelagic species did you catch last year?

yellowfin tuna (`ahi)	_____	**skipjack tune (aku)**	_____
bigeye tuna (`ahi)	_____	**black marlin**	_____
blue marlin	_____	**striped marlin**	_____
ono (wahoo)	_____	**spearfish**	_____
mahimahi	_____	**sharks**	_____
sailfish	_____	**broadbill swordfish**	_____

12. Which kinds of fishing did you do last year?

holoholo ("recreational") **fishing** _____
kaukau ("food") **fishing** _____
expense ("pay for gas and supplies") fishing _____
profit ("commercial") **fishing** _____

13. What percentage of your yearly gross income comes from fishing?
less than 5% ___ 5-50% ___ 51-100% ___

14. Which of the above kinds of fishing do you most often set out to do? _____

15. What fishing clubs and/or associations do you belong to?
_____

16. How many pelagic (for example, tuna or billfish) tournaments do you enter in a year? _____ Which ones? _____

17. Please give a specific example of the relationships linking the people who fish with you. Using lines and labels (for example, *friend*, *father*, *son*, *wife*, *business partner*, *boss* or *employee*, or *associate*, *acquaintance*, etc.) diagram how people on the boat you fish on **know you and one another**. Be sure to show how **all** people aboard—including those (small children, guests, elders) who may not be fishing)—are tied to one another.

[Use people's first names. Use **C** for captain, **N** for persons not fishing.]
[If charterboat fishing, use **C** for captain, **K** for crew, **A** for anglers, and **N** for persons not fishing.]

person #1 (you) person #2 (age, sex)

person #3 (age, sex) person #4 (age, sex)

person #5 (age, sex) person #6 (age, sex)

person #7 (age, sex) person #8 (age, sex)

II. FISHING ISSUES

1. Was **fishing better or worse** for you over the last 12 months?

2. When you think of the **condition of pelagic species and other sealife**, what problems worry you the most?

3. When you think of the **condition of the fishing industry and what fishing means to people and communities**, what problems worry you the most?

4. What changes in **management regulations** would you like to see implemented in the pelagic fisheries?

5. What country (or state or region) has the best **management system** for the pelagic fisheries?

6. If pelagic fishing remains the same for you over the next year as it was over the last 12 months, will you continue fishing (yes or no)? What changes will you make?

7. Do you consider it acceptable for **blue marlin to be sold** (yes or no)? If so, under what conditions?

8. looking to new research possibilities, what would you personally like to know about **fish and the marine environment**?

9. Looking to new research possibilities, what do you think is important for people to know about the **cultural and social value of fishing**?

III. BILLFISH AND PELAGIC CONDITIONS

Instruction: "This task is designed to explore the different ways in which people think about billfish and pelagic species. Take a few moments and look at these ten cards with fish names on them. Then sort the cards into piles (as many as 9 or as few as 2), putting fish that are similar to one another in the same pile. After you have finished, indicate for each pile the reasons you had for creating the pile.

Mahalo for helping in this research effort. If you would like to participate in future studies and would not object to being contacted by mail, please provide your mailing address and telephone.

Fish Cards

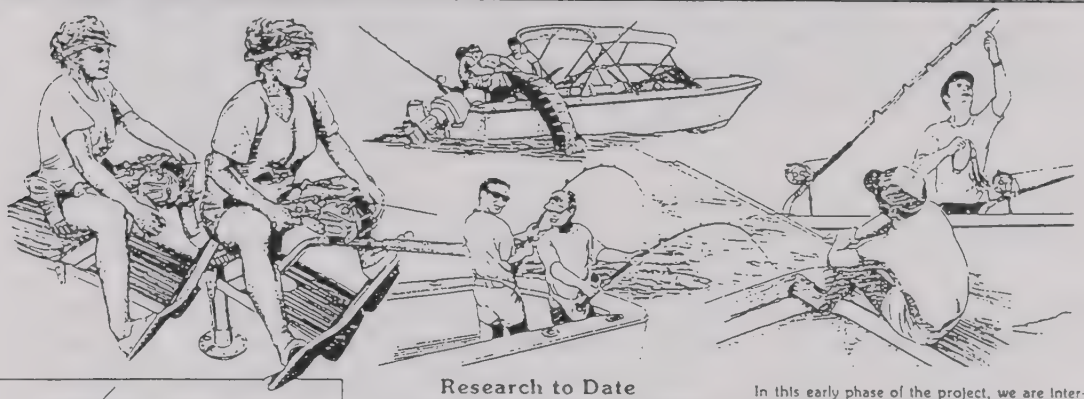
BLACK MARLIN	**SHARKS**
STRIPED MARLIN	**MAHIMAHI**
(SHORTBILL) SPEARFISH	**BLUE MARLIN**
`AHI (YELLOWFIN/BIGEYE TUNA)	**SAILFISH**
SKIPJACK TUNA	**ONO (WAHOO)**

Appendix 4. *Hawaii Fishing News* Article

The People End of the Line

by Dr. Marc L. Miller

This column introduces a multiyear project focusing on cultural and social aspects of the Hawai'i troll and handline fishery.



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■ Why do people fish? How important are troll and handline fishing to fishermen and society? What is a "recreational" fishing experience? These questions are of great interest to the **Western Pacific Regional Fishery Management Council** (WESPAC)–a quasi-federal entity responsible for fishery policies in the 3- to 200-nautical mile exclusive economic zone (EEZ) created by the **Magnuson Fishery Conservation and Management Act** (MFCMA) of 1976. One of the jobs of WESPAC is to decide how much tuna, billfish, mahimahi, ono and other pelagic species can be harvested around Hawai'i each year, and how this should be allocated to different elements of the fishing industry.

Cultural and Social Mandate

Today, federal law and council objectives recognize that successful management requires scientific understandings of the people who fish as well as the fish and the ocean. The condition and future of fishing communities, families and businesses are prominent topics on the WESPAC agenda. To the extent that the small-boat troll and handline sector–or any other fishery sector–is misunderstood by fishery managers, or neglected in fishery analyses, its fishermen will pay a policy price.

The basic theme of WESPAC fishery management is that fishery policies should be attuned to the goal of optimum yield (OY). According to the Magnuson Act: "Optimum yield. . . is prescribed on the basis of the maximum sustainable yield. . . as modified by any relevant economic, social or ecological factor " (Sec. 3[21].)

Beyond the attainment of OY, specific goals of the council's "Fishery Management Plan for the Western Pacific Region" include enhancing opportunities for 1) recreational fishing experiences, 2) traditional fishing practices for nonmarket personal consumption and cultural benefits, and 3) commercial (including charterboat) fishing. In the policy-making process, the council considers the "best available" scientific information in addition to industry and public input.

Research to Date

Insofar as the human dimensions of fishing are concerned, by far the greatest amount of scientific attention has been paid to economic issues. Typically, the "importance" of fishing is estimated by federal and state fishery agencies with calculations of vessel and market values, jobs created and nutritional impacts.

Increasingly, the council and federal and state fishery agencies are aware of the need to complement economic measures of the significance of fishing in society with cultural and social findings. To say that fishing has cultural value is to say that activities such as harvesting fish and sharing the catch hold communities together and give meaning to a "way of life." To say that fishing has social value is to say that the relationships that develop between fishermen matter.

Hawai'i Styles of Fishing

This column introduces a multiyear project focusing on cultural and social aspects of the Hawai'i troll and handline fishery. The project is designed to help WESPAC appreciate diversity in its constituency and is funded by the **Pelagic Fisheries Research Program** (PFRP) housed within the **Joint Institute for Marine and Atmospheric Research** at the University of Hawai'i at Manoa.

In preparing the study proposal, I relied on Jim Rizzuto's excellent "FISHING Hawai'i Style" for background information on fishing gear, target species and techniques. In short, the goal of my project is to follow Jim's lead and reveal the human side of the pelagic fishing equation. The study seeks to report how people interact with one another through fishing and what fishing means to them. Fortunately, Jim thinks the project is timely and *HAWAII FISHING NEWS* editor/publisher Chuck Johnston has encouraged me to discuss it here.

You Can Help in the Study

The many excellent articles that have appeared in *HFN* have helped our research team appreciate how fishing brings people together.

Because readers tell about their experiences in their own words, the "Holoholo Style" section has been especially valuable in illustrating that fishing is a shared experience with many intangible rewards beyond money and nutrition. Reading the letters, one quickly learns that while the commercial, recreational and subsistence categories for fishing and fishermen may be useful for some summary statistical purposes, they often fail to reflect the flexible and complicated ways people are committed to fishing.

Letters show that the various Hawai'i fishing styles allow people to get away from city routines, enjoy the marine environment and catch fish at the same time. Fishing also lets people relax together and talk story. These are exactly the kinds of social and cultural rewards that our project hopes to systematically document.

In this early phase of the project, we are interested in getting examples of fishermen's descriptions of their own troll and handline pelagic fishing trips. With a framework that a trip begins when someone has the idea to go fishing and ends when the boat and equipment are stored and the catch is about to be distributed, we ask readers to recall a particular trip and to send us their personal answers to several sets of questions.

Mahalo. . . . Marc

Troll and Handline Survey

(For longer responses, use a separate paper)

1. In the fishing trip you are describing, what kind of fishing (*holoholo* [recreational], *kau kau* [food], *expense* [pay for gas and supplies], or *profit* [commercial]) did you set out to do, and what kind of fishing did you finally end up doing? What species did you go after, and what did you catch?

2. What are the *'ohana* (very extended family), *friendship* and *hui* (group, club, firm, etc.) ties in fishing? What are your relationships (for example, father, sister, cousin, brother-in-law, friend, work associate) to *each* of the people who went fishing with you, or who participated in trip preparation and cleanup? (How old are they? What sex?)

3. For the persons above, what *fishing-related tasks* did each person have? For those who went out on the boat, which people fished? What were the *nonfishing activities* of adults and children on the trip?

4. Finally, if you would be interested in talking more with members of the research project about cultural and social aspects of troll and handline fishing, provide your name, mailing address and telephone number.

Please send your fishing trip descriptions to:

Dr. Marc L. Miller
School of Marine Affairs HF-05
University of Washington
Seattle, Washington 98195
Phone (206) 543-0113
FAX (206) 543-1417

Appendix 5. Fishery Surveys and Instruments

1. Hamm, David C. and Lum, Henry K. 1992. *Preliminary results of the Hawaii small-boat fisheries survey*. NMFS -Honolulu Lab administrative report H-92-08.

   This study interviewed fishermen at eight different public ports on Oahu, and used the sample data to estimate island-wide catch and effort. "Small-boat" refers to any size of vessel moored or launched at any of these ports, except for the easily identifiable commercial vessels, such as the aku sampans, large-scale charter boats, and longliners. Sample size was 1,370 interviews between March 1990 and May 1991.

2. Harman, Robert F. and Katekaru, Alvin Z. 1988. *1987 Hawaii commercial fishing survey*. Division of Aquatic Resources, Department of Land and Natural Resources, State of Hawaii.

   This survey was a mail-in questionnaire sent to every fisherman holding a FY 1987 State of Hawaii commercial marine license on October 30, 1987. The summary information is based on the responses by the ninth week following the mailing: 768 respondents of 2,529 questionnaires mailed. The summary results are grouped by island of residence.

3. Samples, Karl C. and Schug, Donald M. 1985. *Charter fishing patrons in Hawaii: A study of their demographics, motivations, expenditures and fishing values*. NMFS Honolulu Lab administrative report H-85-8C.

   This survey was an interview of 732 charter boat patrons dockside at Kewalo Basin, Oahu, supplemented by 457 patrons who also completed the mail-in questionnaire . The dockside questionnaire was short and simple, and the mail-in questionnaire addressed either expenditures or valuation. All responses were gathered between March and August of 1984.

1. Residence:

[ ] Kauai [ ] Molokai [ ] Maui [ ] non-Hawaii resident
[ ] Oahu [ ] Lanai [ ] Hawaii

2. Fishing method you use most (check only one):

[ ] Trolling
[ ] Deep-sea handline (bottomfish)
[ ] Inshore handline (opelu, akule, etc.)
[ ] Nets
[ ] Spearfishing
[ ] Ika-shibi/palu-ahi
[ ] Flagline
[ ] Aku boat
[ ] Traps
[ ] Aquarium fish collection
[ ] _____ Other (please print)

3. Percent of total (gross) income made from fishing:

[ ] 0% = Recreation
[ ] 1-50% = Part-time Commercial
[ ] 51-100% = Full-time Commercial

4. Average number of days per month you fish:

a. June-August [ ] 1-7 [ ] 8-14 [ ] 14+
b. September-May [ ] 1-7 [ ] 8-14 [ ] 14+

5. Compared to five years ago, has the average size of the fish you caught in the last year:

[ ] increased [ ] decreased [ ] stayed about the same

6. Compared to five years ago, how far do you now travel to catch fish:

[ ] not as far [ ] farther [ ] about the same

7. a. Do you own a boat? [ ] Yes [ ] No
b. If you own a boat is it currently insured? [ ] Yes [ ] No
c. If you own a boat and it is not presently insured, have you tried and failed to get vessel insurance? [ ] Yes [ ] No

8. a. Do you trailer your boat? [ ] Yes [ ] No
b. If you trailer your boat, are you satisfied with the launching ramps and ramp facilities in your area? [ ] Yes [ ] No
c. If you are not satisfied with the launching ramps and ramp facilities, why not? (you may check more than one)
[ ] Too crowded
[ ] Too far from fishing grounds
[ ] Bad conditions or unsafe
[ ] Other (please print) _____

9. Are you satisfied with the ice facilities in your area? [ ] Yes [ ] No

10. a. Do you have trouble getting bait in your area? [ ] Yes [ ] No
b. Do you usually buy or catch your bait? [ ] Buy [ ] Catch
c. What types of bait do you use? 1) _____ 2) _____

11. Have you read the "Hawaii Digest of Fishing Laws?" [ ] Yes [ ] No

12. a. Are you satisfied with Hawaii's fishing laws and rules? [ ] Yes [ ] No
If "no" what do you think are the problems? (you may check more than one)
b. Legal minimum fish sizes: [ ] Too Small [ ] Too Big
c. Bag (daily catch) limits: [ ] Too Few [ ] Too Many
d. Protected areas (regulated or no-fishing "kapu") [ ] Not Enough [ ] Too Many
e. Legal minimum mesh sizes: [ ] Too Small [ ] Too Big
f. Enforcement of existing regulations: [ ] Adequate [ ] Not Adequate
g. Other (please print) _____

13. a. In your opinion, is commercial fishing generally good now? [ ] Yes [ ] No
b. If "no" what do you think are the reasons? (you may check more than one)
[ ] Fewer fish due to overfishing
[ ] Fewer fish due to natural cycles or climate change
[ ] Fewer fish due to urbanization and pollution
[ ] Competition from foreign and mainland fishermen
[ ] Seasonally unstable markets
[ ] Other (please print) _____

14. Do you feel that the following State projects have helped Hawaii's fishermen?

	Yes	No	Don't Know
a. FAD buoys/trolling alleys	[ ]	[ ]	[ ]
b. Non-nehu baitfish culturing	[ ]	[ ]	[ ]
c. Development of ciguatera fish poison test kit	[ ]	[ ]	[ ]
d. Building artificial reefs	[ ]	[ ]	[ ]
e. "Burnt Tuna" research	[ ]	[ ]	[ ]
f. Monthly Fish Catch Reports	[ ]	[ ]	[ ]
g. Market development for taape	[ ]	[ ]	[ ]
h. New fishing grounds exploration	[ ]	[ ]	[ ]
i. Other (please print) _____	[ ]	[ ]	[ ]

15. In your opinion, how would the following projects affect fishing in Hawaii?

	Would Help	Would Not Help	Don't Know
a. Studies of ahi movement	[ ]	[ ]	[ ]
b. More protected (regulated or no-fishing "kapu") areas	[ ]	[ ]	[ ]
c. More FAD buoys	[ ]	[ ]	[ ]
d. Studies relating fishing to oceanography	[ ]	[ ]	[ ]
e. More artificial reefs	[ ]	[ ]	[ ]
f. More studies on "Burnt Tuna"	[ ]	[ ]	[ ]
g. Ciguatera fish poison test kit	[ ]	[ ]	[ ]
h. Improved information & education about Hawaii's resources	[ ]	[ ]	[ ]

16. Which of these sources have helped you learn about fishing and Hawaii's marine life? (you may check more than one)

[ ] Television/Radio
[ ] Fishing Supply Store
[ ] Newspapers/Magazines
[ ] Public/Private Schools
[ ] State of Hawaii—Division of Aquatic Resources
[ ] Federal—National Marine Fisheries Service
[ ] University/Sea Grant Program/Waikiki Aquarium

17. Please suggest a State activity or project that you think would help fishermen in Hawaii (please print):

_____

_____

_____

Thank you very much for participating in the census. Please fold, seal and return the postage-paid questionnaire.

SPECIAL CHARTER FISHING SURVEY

Date: ☐☐☐☐☐☐ Port: _____ ☐☐

Time: ☐☐☐☐ Boat Name: _____ ☐☐☐☐

Interviewer _____ ☐ Sea Conditions ____ <4' (1) ____ 4-8' (2) ____ 8-12' (3) ____ >12' (4)

The University of Hawaii is conducting a survey to learn more about the needs and attitudes of charter fishing customers in Hawaii. We would appreciate it if you would take a few minutes to answer a few questions.

1. May I ask where you're from?

____ Mainland U.S. (1) Hawaii ____ Local Island (3)
____ Outside the U.S. (4) ____ Other Island (2)
____ Refused (9)

The first part of this survey you can take with you and return it to us at your convenience in this self-addressed, stamped envelope. In return for your completed questionnaire, we will send you one of these free gifts (show choices).

____ Non-Resident Expenditure (1) ID# 1☐☐☐
____ Other Island Expenditure (2) ID# 2☐☐☐
____ Local Island Expenditure(3) ID# 3☐☐☐
____ Fishing Value (4) ID# 4☐☐☐
____ Refused (9)

THE SECOND PART OF THE SURVEY CONSISTS OF A FEW BRIEF QUESTIONS.

2. How would you rate Hawaii deep sea charter fishing in terms of its importance to you as a vacation or leisure activity. Is charter fishing not important at all, moderately important or very important?

____ Not Important (1) ____ Moderately Important (2)
____ Very Important (3) ____ Don't Know (8) ____ Refused (9)

3A. Did you personally catch any fish during your fishing trip today?

____ No (1) ____ Yes (2) ____ Refused (9)

3B.

Type		Number
_____	☐☐	☐☐
_____	☐☐	☐☐
_____	☐☐	☐☐

Code "98" if don't know.

4A. Did anyone else on your boat catch any fish during your fishing trip today?

____ No (1) ____ Don't Know (8)
____ Yes (2) ____ Refused (9)

4B. Type Number

_____ ☐☐ ☐☐

_____ ☐☐ ☐☐

_____ ☐☐ ☐☐

_____ ☐☐ ☐☐

Code "98" if don't know.

5. Did you take a half-day or full-day fishing trip today?
____ Half-day (1) ____ Full-day (2) ____ Refused (9)

6. May I ask you what you paid for your fishing trip today?
$____ per person $____ your share of private charter
____ Don't know (888) ____ Refused (999)

7. Did any family members accompany you on your fishing trip?
____ No (1) END OF INTERVIEW ____ Refused (9)
____ Yes (2) (Go to Question 8)

8. We would like to get an idea of the sex and approximate age of each of the family members.

Beginning with the first member, are they male or female? (record sex) Which category includes the age of this individual—just say the letter. (show card)

(Repeat for all family members)

1) Sex: ____ Male (1) ____ Female (2) ____ Refused (9)
Age: ____ A (1) ____ B (2) ____ C (3) ____ D (4) ____ E (5) ____ Refused (9)

2) Sex: ____ Male (1) ____ Female (2) ____ Refused (9)
Age: ____ A (1) ____ B (2) ____ C (3) ____ D (4) ____ E (5) ____ Refused (9)

3) Sex: ____ Male (1) ____ Female (2) ____ Refused (9)
Age: ____ A (1) ____ B (2) ____ C (3) ____ D (4) ____ E (5) ____ Refused (9)

4) Sex: ____ Male (1) ____ Female (2) ____ Refused (9)
Age: ____ A (1) ____ B (2) ____ C (3) ____ D (4) ____ E (5) ____ Refused (9)

5) Sex: ____ Male (1) ____ Female (2) ____ Refused (9)
Age: ____ A (1) ____ B (2) ____ C (3) ____ D (4) ____ E (5) ____ Refused (9)

6) Sex: ____ Male (1) ____ Female (2) ____ Refused (9)
Age: ____ A (1) ____ B (2) ____ C (3) ____ D (4) ____ E (5) ____ Refused (9)

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OFFSHORE CREEL SURVEY INTERVIEW FORM

Port (___) _____ Date: ___/___/___ (Month / Day / Year) Interview # _____

Interviewer (___) _____ Time _____ Page ___ of ___

For Fishing Boats

Boat Name/No. _____ / _____ Boat Length _____ ft. Was Fishing Done? Yes / No

Time Depart _____ Time Return _____ How Many People Fished? _____

Method Used	Hours	Catch (lbs)	Method Used	Hours	Catch (lbs)
10. Trolling			50. Net (Type_____)		
20. Bottomfishing			60. Trap (Type_____)		
30. Spear			70. Tuna Handline		
40. Casting (spin)			80. Other _____		

Disposition of catch? % Keep _____ % Sell _____ % Other _____

Est. max miles from shore? _____ Buoys fished? Yes / No Which ones? (___) (___) (___)

(*For Heeia-Kea Interviews Only:* Did you fish - Inside Kaneohe Bay?____ Outside?____ Both?____)
(Show map and explain boundary; ask fisherman if fish caught in or out of bay, then please note in REMARKS below)

Rain? Yes / No Wind (est. mph) _____ Seas (est. ft.) _____

Catch by Method

Meth. Code	All? Y/N	Species/ Group	No. Landed	Actl/ Est	Lb. Landed	Actl/ Est	Est. Lb not Landed	REMARKS

Survey by Omni Trax Group Inc. for the Division of Aquatic Resources, Department of Land and Natural Resources, State of Hawaii, 1990

Appendix 6. Hawai`i Billfish Tournaments[1]

The Hawaiian Islands are known for their plentiful fishing grounds. Hawaiian communities host a number of offshore fishing tournaments throughout the year, which attract fisherman from all over the world. While many pelagics, such as *ono* (wahoo), *mahimahi* (dolphin fish), *kamanu* (rainbow runner), and *ulua* (jack), are readily caught by fisherman in Hawaiian waters, it is the big pelagics, *a`u* (pacific blue marlin, black marlin, striped Marlin, shortbill spearfish), *a`uku* (broadbill swordfish), *a`ulepe* (sailfish), and *`ahi* (yellowfin and bigeye tuna) which are the targeted species in competitive billfish tournaments.

I. Hawai`i Billfish Tournaments 1995 (by island)

State-Wide

April Fools Day Tournament
April 1 and 2, 1995

Memorial Day Tournament
May 27, 28 and 29, 1995

Hawaii Big Game Fishing Club 4th of July Tournament
July 1, 2 and 4, 1995

Labor Day Tournament
September 2, 3 and 4, 1995

O`ahu

Senorita's Tournament (Wahine Only)
April 22 and 23, 1995

Hoolea Jackpot Tournament
June 9 and 10, 1995

North Shore Hanapa`a Jackpot Tournament
June 21, 22 and 23, 1995

Kaneohe Yacht Club Open Tournament
August 12, 1995

Aloha Jackpot Fishing Tournament
September 1, 2 and 3, 1995

Keehi Jackpot Fishing Tournament
October 7 and 8, 1995

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[1] It is understood among the fishing community that the non-billfish species, *`ahi, ono*, and m*ahimahi* may be legitimate targets in competitive billfish tournaments.

Maui
Lahaina Yacht Club Spring Wahine Tournament
undetermined date

Lahaina Wahine
October 21 and 22, 1995

Lahaina Jackpot
October 27, 28 and 29, 1995

Lanai
Lanai Rendezvous
August 18 and 19, 1995

Hawaii (Kailua-Kona)
Hawaii Light Tackle Tournament
June 10, 11, 12 and 13, 1995

Big Island Invitational Marlin Tournament
June 29 to July 2, 1995

Budweiser Wahine
June 16, 17 and 18, 1995

Firecracker Open
June 30 to July 2, 1995

Skins Marlin Derby
July 6, 7, 8 and 9, 1995

KHBT PRO-AM
July 22 - 28, 1995

Hawaiian International Billfish Tournament
July 29 - August 6, 1995

Okoe Bay Rendezvous
September 7, 8, 9 and 10, 1995

II. The Sociology of Tournament Fishing

Individuals engage in tournament fishing for a number of complex socio-economic reasons. Tournament fishermen are motivated by not only monetary rewards and social recognition, but also by the confluence of competitive forces. These competitive forces include other tournament participants as well as weather conditions and skills of finding and successfully fighting fish. Tournament regulations are stringent and a lapse in judgment or knowledge can cost a team

valuable points. Tournament fishermen are also motivated and rewarded by a collective feeling of excitement, anticipation, and camaraderie. Many people, including the fishermen, the spectators and the surrounding community, are brought together under the auspices of extracting huge fish from the sea. There is a dearth in the academic research literature on this issue. Billfish tournaments have primarily been researched in conjunction with conservation measures and because of the economic value of the recreation fishery.

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III. The Hawai`ian International Billfish Tournament in Kailua-Kona, Hawai`i

The Hawaiian International Billfish Tournament (HIBT), held in August each year, is one of the world's largest billfish tournaments. The Kona coast along the western shore of the island of Hawai`i is one of the few places in the world a fisherman can expect to catch a huge blue marlin. The pacific blue marlin records have long been dominated by Hawaiian fish. The largest marlin ever taken on rod and reel was caught in Hawaiian waters. The 1,805 pound blue marlin was caught on June 11, 1970 by a team of *malihini* (newcomer) anglers who took turns working the fish and thus disqualified it as an International Game Fish Association (IGFA) record. As it is however, the 1,376 pound pacific blue marlin caught off Ka`aiwi Pt., Kona, Hawai`i on May 31, 1982, holds the IGFA world record for that species.

The first Hawaiian International Billfish tournament, held August 23 - 26, 1959, was an all-male competition with twenty-three entries. Women anglers had their own one-day tournaments in 1960 and 1961. Since then they have participated in HIBT tournaments as equals with men. The HIBT has become the World Series for Marlin anglers and consequently has had to limit entries to about seventy teams based on invitation only. A team is comprised of a minimum of four and a maximum of six anglers officially representing a club, city or state. Teams from eighteen to twenty countries compete each year. Priority of entry for the HIBT is based primarily upon the number of points from prior participation in Hawaiian International Billfish Association (HIBA) sponsored tournaments; number of HIBA sponsored and/or endorsed tournaments in which billfish have been caught or released, and placement in the top ten of HIBA sponsored and/or endorsed tournaments.

During the 1960's the HIBT became the locus for scientific studies of marlin and tuna when scientists joined HIBT weigh-in activities at the close of each tournament day. Scientific inspection of every tournament catch brought to the scales continues to this day. Moreover, a tag and release conservation program has been added to the HIBT. Anglers are encouraged to tag and release fish as a scoring incentive.

GLOSSARY OF FISHERY SOCIAL SCIENCE TERMS

The terms below—which include a few Hawaiian words—are those pertinent to the study of the Pacific pelagic fisheries. In some cases, supporting explanation and references are found in the body of this report. Distinctions and priorities of emphasis in the glossary are intended to clarify differences between various analytical approaches to fishery topics, and to improve the contribution of fishery science to fishery management.

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culture — What members of society know in order to behave in appropriate (or inappropriate) ways.

Fish Aggregation Device (FAD) — An artificial structure designed to attract fish.

fishery — A system minimally consisting of a relationship between a population of people constrained by an institutional environment, and a target population of "fish" constrained by an ocean environment.

fishery economics — A field that examines what people who participate in *fisheries* do. A key assumption is that individuals make rational "decisions."

fishery management — An activity in which a governmental or traditional authority develops and implements policies that affect the condition of *fisheries* in the interests of society.

fishery management problem — Borrowing from the literature on social problems, fishery management problems "are what people say they are." These problems arise when constituencies (*e.g.*, fishermen, scientists, special interest groups) identify an unacceptable condition and begin to press for its correction through changes in policies.

fishery science — A multidisciplinary field involving the disciplines of biology, oceanography, ecology, cultural anthropology, sociology, economics, law, mathematics, and statistics, among others.

fishery social science	An emerging field involving applications from such disciplines as cultural anthropology, sociology, economics, political science, and law. Generally, the social sciences examine institutions, and relationships between affect (how people "feel"), behavior (how people "choose"), and cognition (how people "think").
fishery sociology (also fishery anthropology)	A field that examines what people who participate in *fisheries* do. Typically, the domain of inquiry encompasses aspects of life where the *fishery economics* assumptions appear unwarranted.
holoholo	To go out for pleasure; to fish recreationally.
hoaloha	friend, beloved companion
hui	club, association, society, corporation, company, institution, organization
ika-shibi	Night handline fishing using squid as bait.
kahuna	a priest or expert
kapu	taboo, prohibition, special exemption from ordinary taboo, sacredness
kaukau	fishing to pay for expenses, such as fuel and gear
ko`a, ko`a`aina`aumakua	fishing grounds
konohiki	the chief of a Hawaiian land division
`ohana	family relative, kin group
palu-ahi	Day handline fishing using chum to attract `ahi.
social action	Human behavior that is meaningful to others. Thus, a wink illustrates social action, a blink generally does not.

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